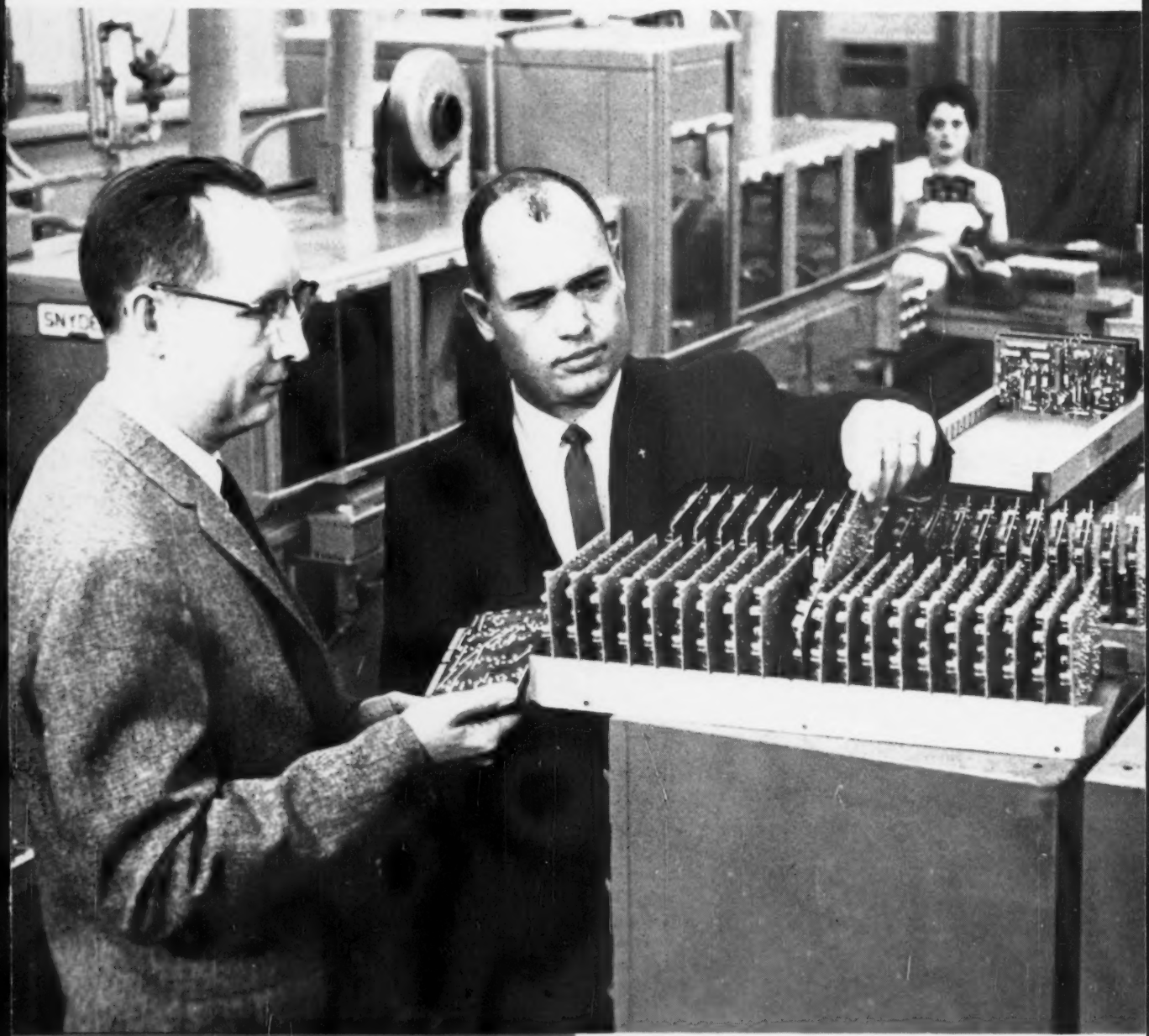
IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JANUARY 26, 1961



★ Burroughs Corp.'s Tree and Perry:

Quick-Dip Soldering Drives Costs Down p. 69

The Uneasy Nonferrous Markets p. 43

Canada: Trouble to the North? p. 50

Digest of the Week p. 2-3

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KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many who may find it useful to review fundamentals from time to time.

When Should Alloy Steels Be Ordered to Hardenability?

What is hardenability and how does it differ in carbon and alloy steels?

Hardenability can be defined as the capacity of steel to develop a desired degree of hardness, usually measured in depth. It is produced by special heating and cooling. Carbon steel, except in small sections, will normally harden to a depth slightly below its surface, while alloy steel can, under certain conditions, harden uniformly through its entire cross-section.

Surface hardness obtainable after quenching is largely a function of the carbon content of the steel. Depth hardness, on the other hand, is the result of alloying elements and grain size, in addition to the carbon present in the steel.

In general, where hardenability is the prime consideration, it is not too important which alloy steel is used, just so long as there is sufficient carbon present to give the prescribed hardness, and there are enough alloying elements to quench out the section. It is not considered good practice to alloy a small section excessively, since excessive use of alloying elements adds little to the properties and can, in some instances, induce susceptibility to quenching cracks.

There are, of course, numerous cases where factors other than hardenability must be considered; such factors as low-temperature impact, heavy shock, creep-resistance, and the ability to resist temper brittleness. Through-hardening, therefore, is not always desirable. For example, shallow hardening is often necessary in shock applications, because a moderately soft core is essential.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

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The IRON AGE

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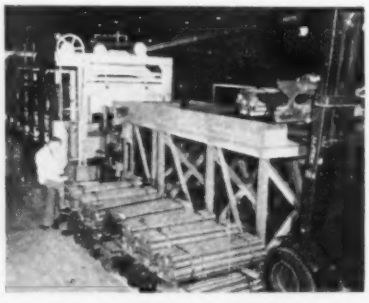
News of the Industry

SPECIAL REPORT

Nonferrous Markets—Most nonferrous prices have sagged in recent weeks. And new price pres-



sures are mounting. One hope for stability: Consumer inventories are said to be down and buying may be in line with consumption. P. 43

VACUUM-MELTING

Big Furnace—Allegheny Ludlum Steel Corp. has put into operation at its Watervliet Works the world's largest vacuum-melting furnace. It can turn out ingots up to 50 in. diameter. P. 47

STEEL RESEARCH

Keeping Customers — Other industries' design problems directly affect steelmakers. The challenge is being met by new research groups. P. 48

CANADIAN RELATIONS

How Serious — U. S. relations with the neighbor to the north are

Metalworking

Cover Feature

SOLDERING — Cold joints have disappeared from the automatic soldering lines at Burroughs Corp., Detroit. Roy Tree (left), production manager, and plant manager A. R. Perry like the benefits. P. 69

becoming strained. The causes are complex and there is no easy answer. Editor-in-Chief Tom Campbell gives his analysis of the situation. P. 50

WEST COAST

Opposition?—The new Kaiser-USWA bargaining plan is not likely to find industry-wide support. There will be some opposed to public representatives at early contract negotiations. Three public members would be observers and, if needed, mediators. P. 59

Engineering-Production Developments

VIBRATORY FINISHING

How It's Used—Here are a few tips from a user of vibratory finishing equipment that underscore the effectiveness of the process. Parts of many shapes can be cleaned quickly with the scrubbing action. P. 72

MACHINING OF COPPER

Aided by Sulphur—It takes just a pinch of sulphur alloyed with copper to improve machinability 450 pct. A new sulphur-copper alloy has the electrical and thermal properties needed in a variety of parts. Nozzles, welding tips and motor parts are examples. P. 74

RADIOGRAPHIC TESTING

Problem Solved—By processing film in only 13 minutes, critical production work can really get into high gear. An automatic film-processing setup can deliver the verdict even before a weldment comes off the rollers. P. 76

ROTOR BALANCING

A Machine's Heart — Dynamic balancing plays a vital role in the production or repair of almost all rotating parts. For this reason, balancing during actual rotation should be considered a pre-production problem. P. 78

PRESS TOOL MEMBERS

How Hard Should They Be?—Here are some common rules of practice that will help you design the correct hardness into your die plates and punches. Press tools last much longer when they're designed properly. P. 81

Market and Price Trends

INSTRUMENT SALES

Increase Predicted — Instrument makers are predicting a sales increase in 1961 of at least 6 pct. The big reason, they say, is that demand has risen from industial research outfits. P. 45

WAREHOUSE SALES

A Slight Pickup — Steel service centers are encouraged by a January improvement in sales. Gains for some are running 15 pct over December. P. 46

AUTOMOTIVE

New Trend in Small Engines?—Aluminum engines are likely to continue in smaller cars, but probably not in larger ones. P. 57

STEEL SUMMARY

Look to March—The steel market is at a standoff with general improvement balanced by auto setbacks. It now looks like March before there is any major movement. P. 107

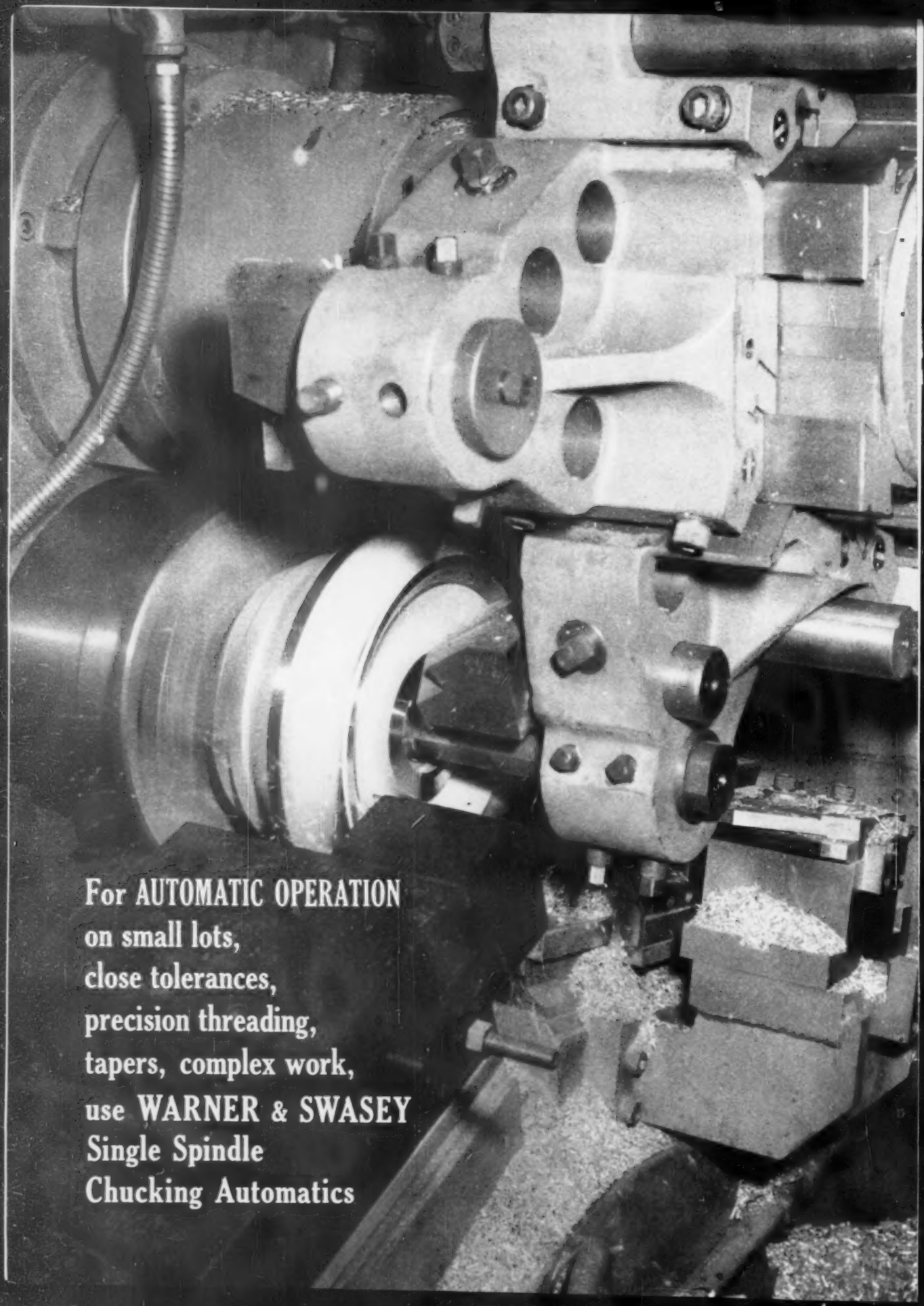
PURCHASING

Increased Pressure—The present buyers market has resulted in additional pressures for the purchasing agent. This has kept buyers on the go recently. P. 108

NEXT WEEK

LABOR ARBITRATION

The Workload Grows — More and more labor-management disputes are being settled by arbitration. A recent Supreme Court decision will probably cause even more cases. But there are ways to avoid unnecessary expense.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The Presidency: It Changes the Man

John F. Kennedy is no longer running for President. He has the job. No matter what he thought before, he will think differently now.

Throughout the history of our nation, the office of the Presidency has made the man. Or if it hasn't made him, it has always forced him to the heights of his innate ability.

Where Mr. Kennedy is concerned, it can be assumed that the office he holds will do more to mature him, if he needs maturity—than age, advice, or God-given common sense.

The problems talked of in the campaign are not now the same for Mr. Kennedy. Then he did not have the personal challenge. Then, he did not have the responsibility to perform for all of us in our country.

He has surrounded himself with a savvy, intelligent, cabinet. Yet we are told that he will listen, but act on his own. That may be so. But before he is in office a month, he will find that he must absorb the best that his cabinet has to offer before he acts on his own.

In this day our problems are more than mere catch words in a speech. It will be Mr. Kennedy's duty to do what most of us have no chance to do: Act for the nation, act ahead of the nation, and act for the good of the people.

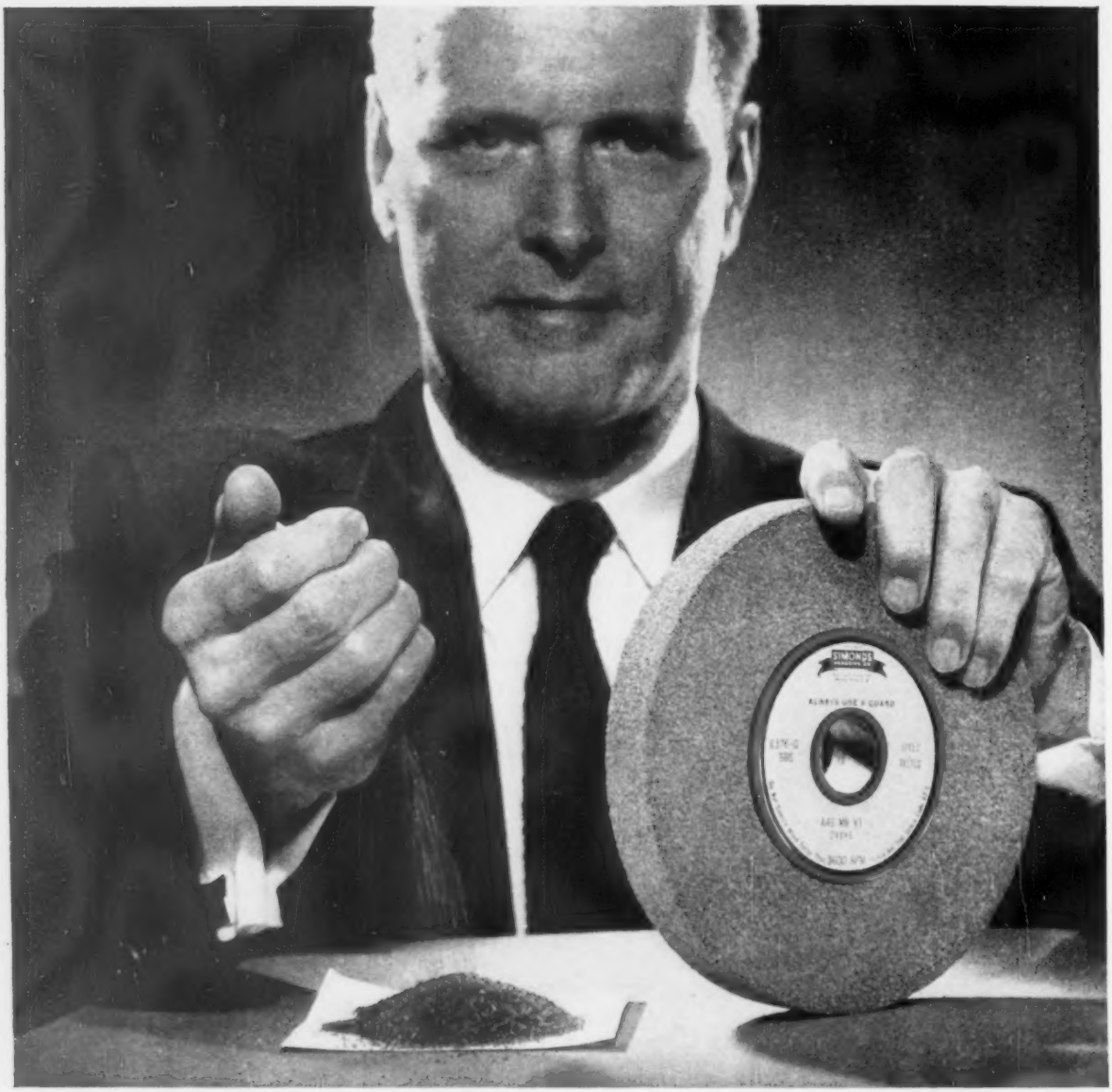
Today, many of us appear to be interested in two things: A feeling that we can't or won't do anything about our national problems, and—with some—a cynical question of "what is there in it for me?"

No one who reached the highest office in the United States thought that way, except for a very few men in our history. Mr. Kennedy will not be one of those men. The office he holds will temper some of his enthusiasm and make him, as it has others, a full, deep-thinking, and perhaps a sad-but-wise man.

We need criticism. We need not agree with things the President does, just because he is President. But more than ever we must give him the benefit of the doubt. At least until he has a chance to prove himself. Certainly he needs the support of all of us.

Tom Campbell

Editor-in-Chief



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The Appraisal: Is Worst Over?

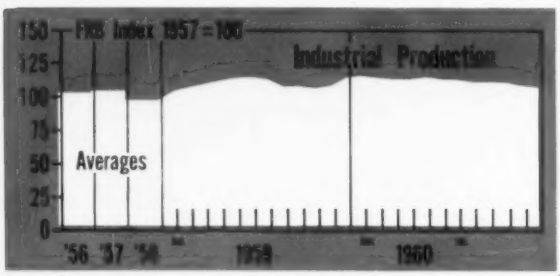
There is little aid and comfort for industry in current business indicators. The best that can be said is that the worst is probably over. But no big uptrend in any of the big metalworking areas is likely to be felt until well into the second quarter.

Right now, general industrial production is not doing much to show a gain over the dismal (although expected) drop in December. (See chart, below.) Steel operations are a little better, but the January improvement is not as significant as hoped for. Nonferrous producers (see Special Report, p. 43) are fighting weak markets and price softness.

Most businessmen see low inventories as the best single hope for improvement. You will find an occasional company that, for reasons of its own, is cutting back inventories. But for most, the end of the cutback cycle is here. But as Joseph Block, Chairman of Inland Steel, pointed out last week, the trend to carrying the lowest possible inventories is something that is here to stay.

Industrial Production at Low Point

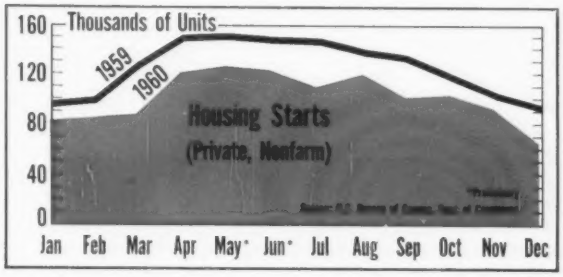
The December rate of industrial production may be the bottom of the decline. About all the factors



of bad weather, holiday shutdowns, and inventory cutbacks combined to bring the Federal Reserve Board's Index of Industrial Production down to 103. (1957=100) This is down two points from November and approaches the level of the 1959 steel strike. Whether January will show improvement is still in doubt. Cutbacks in auto production may prevent the expected upturn.

Housing Starts Drop Again

There are some redeeming factors in the low rate of new housing starts in December. The weather was bad, many prospective home buyers are hoping for lower interest rates, and the general economy was not conducive to planning a new home. But the figure



of 65,600 private non-farm houses started during the month is not encouraging. And it represents an 18 pct drop from November. For the full year, private nonfarm starts totaled 1,217,800. This compares with 1,494,600 in 1959.

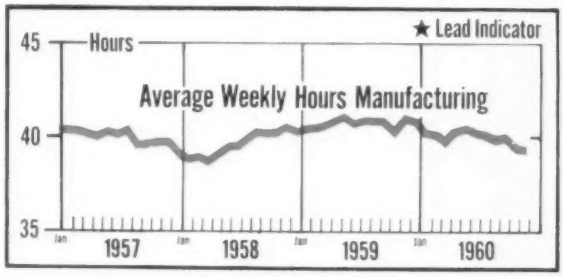
How Are Car Sales Going?

New car sales in early January lagged behind a year ago. Estimates indicate 104,000 U. S. cars were sold in the first 10 days of January. This is 11 pct below last year's 118,000. But last January, dealers were delivering cars on orders placed during the steel strike. As of Jan. 1, inventories of unsold cars totaled 997,000. This is 76 pct higher than a year ago.

At the same time, sales of foreign cars continue to soften. November registrations (32,400) were the lowest in 29 months. And the share of the market for the month (6 pct) was the lowest in 34 months. Imports totaled 466,000 registrations in the first 11 months of the year compared to 559,000 for the same period in 1959.

Workweek Drop Less in Durables

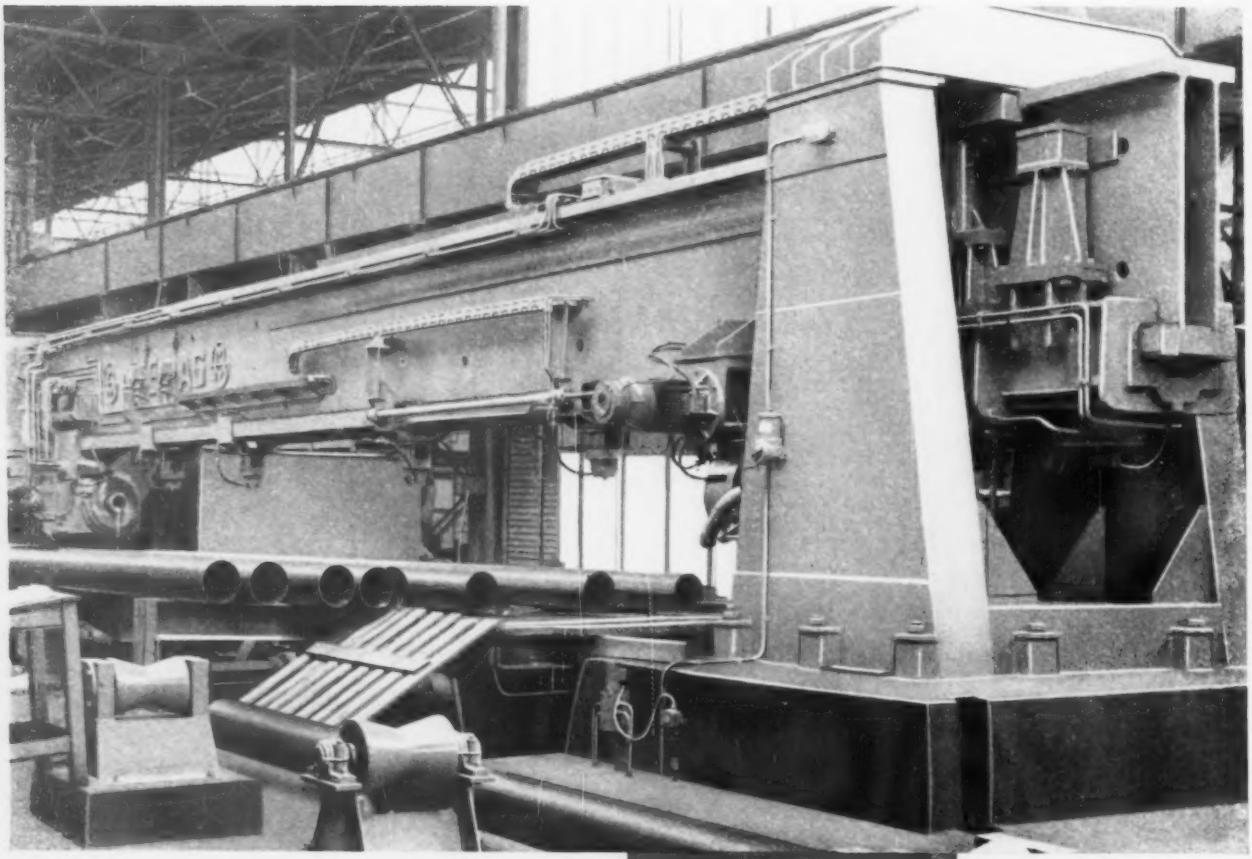
The important leading indicator, average weekly hours, contributes nothing to a brighter business outlook. In December average hours worked by production workers dropped to 38.5, down from 39.0 in November. Most of the decline, in contrast to the



recent trend, is not attributed to durable goods industries. The nondurable work week dropped a full hour during the month.

TUBE ROLLING MILLS

Wherever large plants for the manufacture of seamless or welded steel tubing are required - Mannesmann-Meer should be consulted. We have supplied a large number of these plants, including the Grossrohrwerk Mannesmann-Hoesch, where this picture was taken. We are backed by world-wide reputation and a fund of experience.



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AFL-CIO: Kennedy Disappoints Leaders

Top union leaders are beginning to worry about their relationship

MEANY: "Disappointed."

with President Kennedy. The union-Administration honeymoon isn't over—yet. But it may be wearing a little thin.

Labor men are disappointed over the lack of appointments of union men to top Administration jobs. The only place unions got in strong was the Labor Dept. But they didn't get all of the jobs they wanted.

George Meany, AFL-CIO president, is "quite disappointed," a union spokesman says, over President Kennedy's failure to appoint a union man to a top Defense post.

Union Pension Equity Given Up by Goldberg

The IRON AGE has learned that Secretary of Labor Arthur J. Goldberg has irrevocably renounced a pension equity from the United Steelworkers. He was to have received it when he reached 60.

The Labor Secretary made the move to sever all ties with labor unions and to avoid any hint of "conflict of interest." Also, he won't rejoin his former law partnerships when he eventually leaves Labor.

IBEW: Local Plans Boycott of Jap Parts

A big Midwest union local plans to have its members boycott Japanese electronic parts going into American goods.

Local 1031 of the International Brotherhood of Electrical Workers has notified about 70 employers in the Chicago area that its 23,000 members won't work with Japanese electronic parts or components after May 1. (For other action, see International, p. 13).

The big local said its membership has dwindled by 24,000 members in the past few years.

Automation to Get Top Labor Priority

President Kennedy will call a national conference on automation. The new President says the conference will seek ways to utilize the benefits of automation in industry without displacing workers.

UAW: A Salary for Workers?

Without fanfare, a UAW vice president has been talking up the idea of salary pay for factory workers.

Leonard Woodcock, UAW's General Motors Corp. department director, has been pushing the idea in recent union regional meetings. The first time was last November in Milwaukee. And more recently it was at the union's Skilled Trade Conference.

He says hourly and piecework rates for factory workers should be replaced by the salary system of white collar workers.

He claims the idea "isn't being expressed in the context of the auto negotiations," but is aimed at stimulating thinking. He calls the piecework and hourly rate plan "archaic."

At Milwaukee, Mr. Woodcock went into the economics picture shaping up for 1961 auto contract bargaining. He says it will resemble 1958, and that the salary idea might be aired.

At Chicago he repeated this. The union leader admits the idea hasn't caught on yet, but believes it might be another step toward the guaranteed annual wage.

He points out International Business Machines Corp. put production workers on salary and it seems to be working out very well.

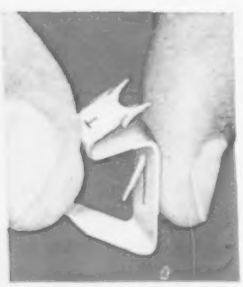
So far, Mr. Woodcock is the only UAW official talking along these lines. But his ideas carry a lot of weight. He says he hasn't developed them to the point where they're ready to lay on the bargaining table, but it's possible they could be brought up next summer.

Increasing automation is one reason Mr. Woodcock thinks salaries to production workers will come. He says the continuous production system no longer lends itself to paying a worker for hourly or piece work.

Some UAW members today already get salaries, mainly for payroll or cost accounting reasons. Usually they're engineering department assistants, clerks or timekeepers.

Another SPEED NUT Savings Story...

62% cost reduction made with **SPEED CLIPS**® on Cramer Posture Chairs



A dozen SPEED CLIPS now do the job of fastening upholstery to the steel seat of Cramer Posture Chairs. Before the switch to Tinnerman SPEED CLIPS, an expensive formed-steel rim was spot-welded to the seat to do this job.

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★Services Press to Up Funds

Top military brass at the Pentagon are trying to jack up Armed Forces budget money by putting the pressure on Defense officials of the new Administration.

The military men are dissatisfied with Defense Dept. allocations in the budget of former President Eisenhower. They are griping, even though Ike's $42.9 billion for Defense is a peacetime record. The budget, for fiscal 1962, is $1.4 billion over 1961, with the three services sharing fairly equally.

Army, Navy and Air Force officers already are pushing expansion plans into the hands of new Defense chief Robert McNamara and his crew. And they are reminding John F. Kennedy's Defense aides that the new President campaigned hard on the point that U.S. defenses are inadequate.

The military is complaining that Ike did not provide enough funds for such pet projects as the Army's Nike-Zeus anti-missile missile, the Navy's missile-carrying Missileer airplane, and the Air Force's Skybolt ballistic missile.

While talking in unison for more money, each service is seeking special treatment for itself. Army and Navy men, in particular, don't like the Air Force's continued top-heavy slice of the budget.

Ike proposes that the U.S. spend $10 billion on the Army; $12 billion on the Navy; and a whopping $19 billion plus on the Air Force. The Defense Secretary's office gets the remaining $1.5 billion.

■ Ike Blames Slump On '59 Steel Strike

Former President Eisenhower's final message to Congress, the Economic Report, blames much of the nation's economic slump on the steel strike of 1959.

Ike says that expansion of the economy at some points in late 1959 and early 1960 "was distorted by the effects of the steel strike." He believes that the greatest production declines in a wide range of industries are, in a large part, the result of the strike.

This does not jibe with last week's report on the steel labor to former Secretary of Labor James Mitchell. (IA—Jan. 19, '61, p. 45)

Ike also says the steel strike, and the failure of labor and management to reach a prompt agreement, led to "imbalances in production rates and inventories." He warns that labor and management had better settle their differences or they will invite new government controls.

In the economic report, the former president backs antitrust moves such as a pre-merger notification bill and a bill giving the Justice Dept. the right to demand "necessary facts" from businesses in antitrust cases.

■ Pre-Merger Bill Picks Up Support

Fuel is being poured on the fire burning under the pre-merger notification bill. No sooner had Sen. Estes Kefauver (D., Tenn.) introduced the bill to require large companies to give the government 60 days notice when they plan to merge than:

President Eisenhower backed pre-merger notification in his budget and economic report.

Rep. Emanuel Celler (D., N.Y.) introduced a similar bill in the House.

The bill would apply to merging companies with combined assets of $10 million or more. Backing for a pre-merger notification bill is growing to unexpected proportions.

■ Will Treasury Seek Depreciation Reform?

Treasury Dept. officials say that the new Secretary of Treasury, C. Douglas Dillon, will include depreciation changes in his tax reform program.

The tax reform program, they say, is already being shaped at top levels—including President John F. Kennedy. The program will get to Congress in the spring.

■ Congressman Fights Lowering of Tariffs

Congressional opposition is growing against lowering U.S. tariff rates at the meeting of GATT (General Agreement on Tariffs and Trade) in Geneva.

Congressman James E. Van Zandt (R., Pa.) is among the leaders of a fight to stop offering cuts in U.S. import duties to foreign countries.

■ Renegotiation Act Likely to Be Renewed

Industry representatives in Washington are trying to stop extension of the Renegotiation Act by the Congress. But they are having no success. The act, which seeks to eliminate excess profits from defense contracts, comes up for review this year.

Industry is asking Congress to let the act expire on June 30. It argues that in peacetime, renegotiation tends to penalize companies doing business with government.

REVERSOL 1133

For the tough jobs other coolants can't handle...

REVERSOL 1133 is a soluble oil for water phase application as a coolant and lubricant for all metalworking operations—especially for tough, troublesome jobs. REVERSOL 1133 performs outstandingly on hard-to-machine steels, cast iron, stainless steel, Rene metal, missile metals and non-ferrous metals. This coolant yields remarkable results in faster, cooler machining; longer tool life; better finishes; closer tolerances and excellent dispersion of metallic silt. REVERSOL 1133 disperses easily in plain water, does not cause dermatitis and it prevents rust and will not stain ferrous or non-ferrous metals. Other features include: long service life and good cleaning properties.

Users who try it for difficult jobs, find it so economical and superior in performance that they change to REVERSOL 1133 for almost all applications, including drawing and stamping.

Write, wire or call for full details on REVERSOL 1133.

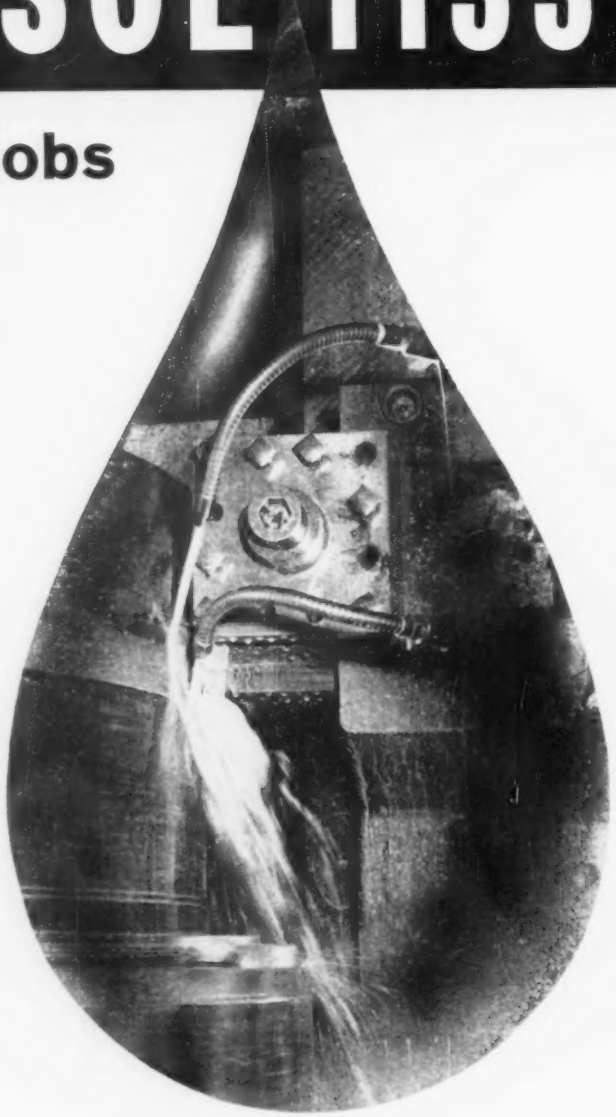

Photo Courtesy of Budd Co., Red Lion Plant

Operation: Machining a section of a pressure vessel
Material: 4340 carbon steel, approx.: 48" dia.
Speed: 97 rpm
Feed: .020
Depth-of-cut: .080

Tool: Carbide
Machine: Giddings & Lewis, Double Head (with side rail) Boring Mill
To achieve a 63 finish:
Speed: 100 rpm
Feed: .009, **Depth-of-cut:** .020

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Electronics Industry Urges Import Action

U. S. radio and television dealers are urging the government to "give serious consideration to the development of reasonable and effective electronic import controls."

The move—officially made by the Electronic Industries Assn.—comes in the wake of increased difficulty in handling products imported from Japan.

James D. Secrest, EIA executive vice president, notes, "The Japanese practice of requiring cash payments has tied up large amounts of dealer capital. In addition, those purchasing directly have had to carry inventory normally stocked by distributors. Many dealers, moreover, have reported difficulties in obtaining adjustments for damaged or substandard merchandise."

Says Mr. Secrest: "Failure (by the government) to act now is certain to bring the U. S. electronics industry down the road of drastically shrinking sales and massive employment cutbacks."

British Steel Capacity Up, Demand Down

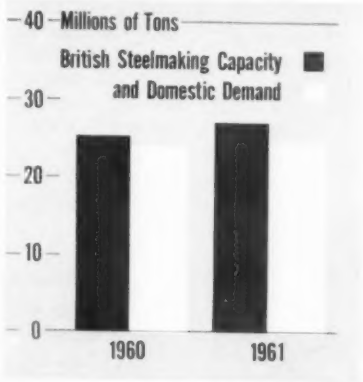
Britain will probably be looking for additional markets for steel exports this year. But with the present level of prices and the state of world demand, it's going to take some real searching.

It could, however, mean even additional competition for U. S. steel producers.

The British in 1960 had a steelmaking capacity of 25.5 million ingot tons. Demand from domestic sources last year was approximately 24.3 million tons. This surplus presented no major export problem for the British.

However, most predictions for 1961 call for a capacity of 27 million tons and no real increase in domestic demand. Reports say the home need "may" rise to 24.5 million tons. But, more likely, it will probably stay right around last year's level.

One of the prime reasons for the slack in England's domestic demand is the unusually cautious outlook by automakers there.



Japan Moves For Iron Ore

The Japanese are planning ahead and looking for additional iron ore. They're doing this at a time when the ore is generally considered to be abundant.

The Japanese have their eye on South American ore. Also, their negotiations involve ore from Australia with definite plans to be firmed in the near future.

This could eventually mean that unless American and European sources pick up Canadian and South American ore, the Japanese are likely to be there ahead of them.

Aid for Industries Hit by Imports?

The Senate Commerce Committee suggests the U. S. start a program of special assistance for industries hard-hit by competing foreign imports.

The committee reports: "The resources of the government should be brought into play to assist an affected industry to improve productivity, move into new and more competitive lines, or otherwise adapt to the competitive situation without undue hardship."

The committee notes that it would rather see such an assistance program than to see a cut in foreign imports.

J&L Goes to Japan

Jones & Laughlin Steel Corp. confirms reports that it has entered into a know-how agreement with a Japanese steelmaker. The Sumitono steel group will pay J&L $1.5 million for aid in the production of flat-rolled carbon steel.

ICA Move Opens Export Opportunities

An order handed down to the International Cooperation Administration means that U. S. exporters will have now opportunity to expand sales abroad.

The ICA was ordered to cease commodity procurement financed with ICA program funds in selected countries for aid transactions initiated after Dec. 5, 1960.

Countries involved: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Luxembourg, Monaco, Netherlands, New Zealand, Norway, South Africa, Sweden, Switzerland, England, and Hong Kong.

The results of this order, in effect, will be a vast market in aid-recipient countries almost exclusively reserved for U. S. products.

How big is this market? In fiscal year 1960, these areas spent $507 million outside of the United States to procure items for ICA-financed projects.

ONE KEY TO COST CONTROL IN '61

Savings like these through Metalogics*

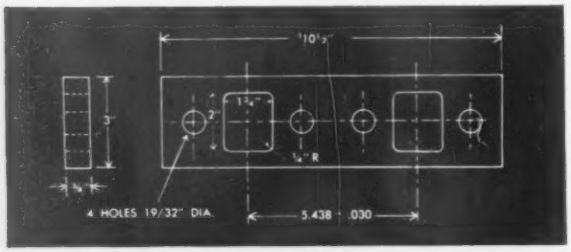
Look at these random examples and see how Ryerson Metalogics sparks real savings for hundreds of companies—in helping to search out new materials, new methods, new machines that will do the job better.

You can count on Ryerson for practical, unbiased recommendations because we offer you:

1. Exceptional knowledge of metals and their characteristics, gained through a century of service to industry as a supplier of metals and machinery for metal fabrication.
2. The nation's largest stocks of steel and aluminum —plus unsurpassed service on industrial plastics.

Your Ryerson representative is "Metalogics-trained" to help you value-analyze selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

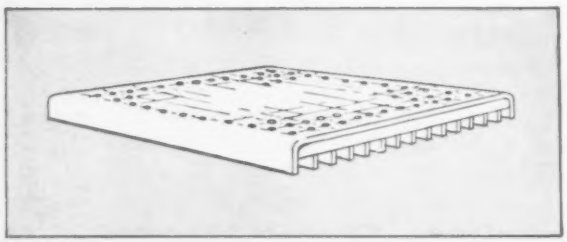
**The Ryerson science of giving optimum value for every purchasing dollar.*



Saved: $100 per thousand

PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100 per thousand pieces and quickly justified the small initial investment in dies.



Suggestion saves 85%

ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅝" holes to filter the product.

RECOMMENDED: After studying application and costs, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson's experience and imagination saved 85% of the original cost.

Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛" diameter length with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an under-driven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

Production upped 30%

BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 sfm and stepped up production 30%. Ryerson's stocks include the widest range of fast-machining alloys.

STEEL • ALUMINUM • PLASTICS • MACHINERY

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Joseph T. Ryerson & Son Inc., Member of the INLAND® Steel Family

French Alter Steelmaking

Injection of oxygen-lime powder is sweeping through French steel mills. For some time, a 30-ton OLP converter has operated on three shifts in the Saar. This converter uses high-phosphorus hot metal. Furnace-lining life averages 200 heats. Other benefits include less siliceous slag and controlled dephosphorization. At Dunkirk, hot-hematite metal will soon be refined in 140-ton converters, using the OLP process.

Adhesives Bond Tools

Heat- and vibration-resistant adhesives secure ceramic cutting tips to tool shanks in the Soviet Union. The adhesive seams resist 250°C for more than 5 hours. Adhesives don't affect the physical and metallurgical properties of the tool materials. Ceramic tips can be ground even after they're bonded to the shanks.

Super-Sensitive Gage

Getting much attention is a new strain gage that offers good sensitivity at high temperatures. It's a flexible gage, made of a single silicon crystal, that operates at temperatures up to 500°F. The newcomer is larger than many other strain gages; but it's claimed to be 65 times as sensitive as standard high-temperature gages.

More Go to Oxygen Lances

Oxygen use in openhearths continues to grow rapidly. Estimates are that about 25 pct of the openhearths in the United States are now fitted with oxygen-roof lances. This figure, some 225 furnaces, is more than double the number that used oxygen lances only three years ago.

Truck Takes to Water

A "swimmable" truck, developed for the U. S. Army, won't sink even when filled with water or shot full of holes. It's equipped with an air-cooled engine and propellers for water movement, and carries a 5000-lb load. Polyurethane foam in wheel-well sponsons and body panels of aluminum honeycomb keep the truck floating. Top speeds are 55 mph on land and 5.2 mph in water.

Electroslag Remelting

Tests, conducted at the Czechoslovak Research Institute of Ferrous Metallurgy in Prague, confirm that electroslag remelting yields top-quality steels. It improves the surface and macro-structure of ingots. This insures dense, homogeneous, fine-grained metals. Other benefits include lower sulphur, nitrogen and hydrogen content and fewer nonmetallic inclusions.

Protects Tantalum

Attaching a small piece of platinum to a big tantalum part inhibits hydrogen embrittlement. A continuous coating isn't needed. Sputtering, spot welding or mechanical attachment of the platinum creates a galvanic coupling. In concentrated hydrochloric acid at 374°F, tantalum in contact with platinum — in an area ratio of 10,000:1—resists embrittlement for more than 1000 hours. Without platinum, tantalum becomes embrittled in a few hours in this environment.

Isotopes Find More Uses

Nuclear byproducts serve in more and more research work. They improve plating processes, aid in diffusion-materials studies and gage machine-tool and engine wear. Isotopes check out casting methods for high-strength parts such as turbine components. Low-energy photon sources speed radiographic testing of aluminum castings.

Faster Acceleration?

Magnesium impellers reduce inertia in automotive gas-turbine engines. These impellers boast a high strength-to-weight ratio and good dimensional stability. Turbine engines, now being tested at 45,000 rpm, have an actual engine-acceleration lag of less than 1½ seconds from idle to rated output. Operating temperature is 200°-400°F.

Every valve you need for a complete hydraulic system . . . from WOOD

Need a special valve or a complete hydraulic system? Call on R. D. Wood Company for help from men who know their high pressure valves. Take the line-up below, all Wood valves from one hydraulic forging press installation, working pressure 4500 psi. Note the broad range of sizes and types, from the small Stop and Check Valves to the large 6" x 8" Shock Alleviator Valves. They have been developed from years of experience in designing and building hydraulic equipment. Whatever your requirements, our engineering staff can design and apply the correct valves to do the job. Write today for complete information contained in the Wood brochure, "High Pressure Hydraulic Valves."

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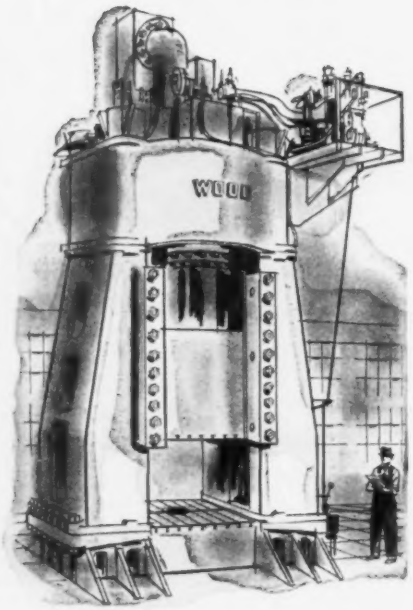
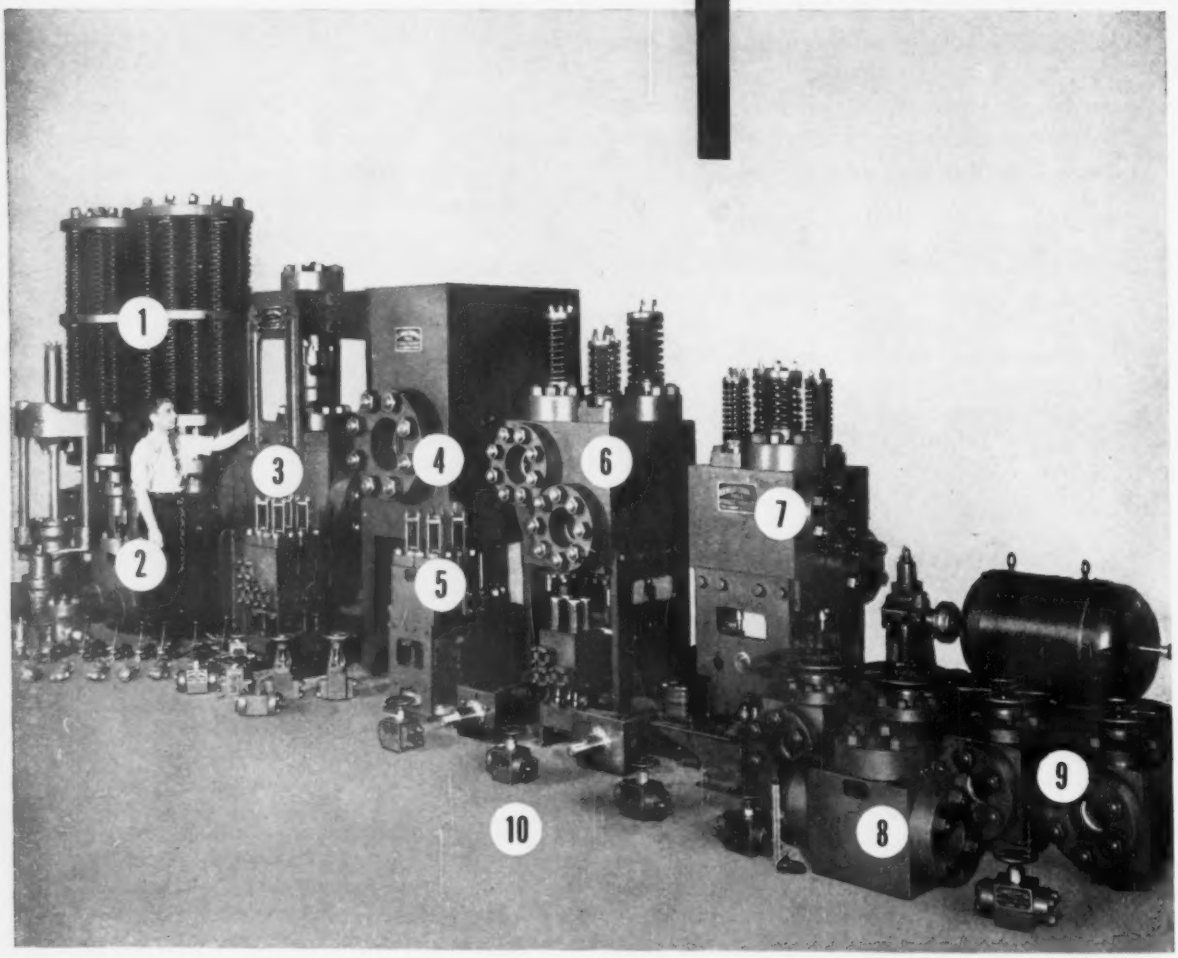




1. 6"x8" Shock Alleviators **2.** 2½"x4½" Twin Tilting Valve **3.** 9" Accumulator Shut off Valve **4.** 9" Accumulator Safety Shut off Valve **5.** 1½" Mandrel Gear Control Valve **6.** 6" Control Valve **7.** 4½" Control Valve **8.** 4" Check Valve **9.** 4" Stop Valves **10.** Misc. Stop, Check and Control Valves

PERFECT SEALS OF METAL TO GLASS
keep this Radar System on Track

Hundreds of components in this radar system—tubes, connectors, thermal relays, transistor stems, etc. contain seals of metal to glass. These seals are made possible by special metal alloys having the same expansion coefficient as glass.

At Bishop we have been making glass-to-metal sealing alloys in tubular and composite wire form for many years. In addition, we produce stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as clad metals, super and "exotic" alloys.

We also produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. P-6 describes our platinum products. Write for them.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 35 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

Now! Make any pushbutton station you want with new, completely versatile Cutler-Hammer oiltight pushbuttons

Choose from a complete line of operators, get greater circuit flexibility than with any other make

To meet today's need for a broad range of oiltight pushbuttons, Cutler-Hammer gives you a new versatile line.

You can get these rugged proved pushbuttons in one hole or base mounting, six bright colors. More than thirty different circuit arrangements are available plus hundreds of varieties of stations in standard arrangements of up to 25 elements. And you can get up to 8 circuits on one pushbutton. The flexible oil resistant diaphragm behind the button is designed to stay soft and pliable permanently.

With Cutler-Hammer pushbuttons you can get more control in less space, too, because they use 40% less behind the panel space than the next smallest unit.

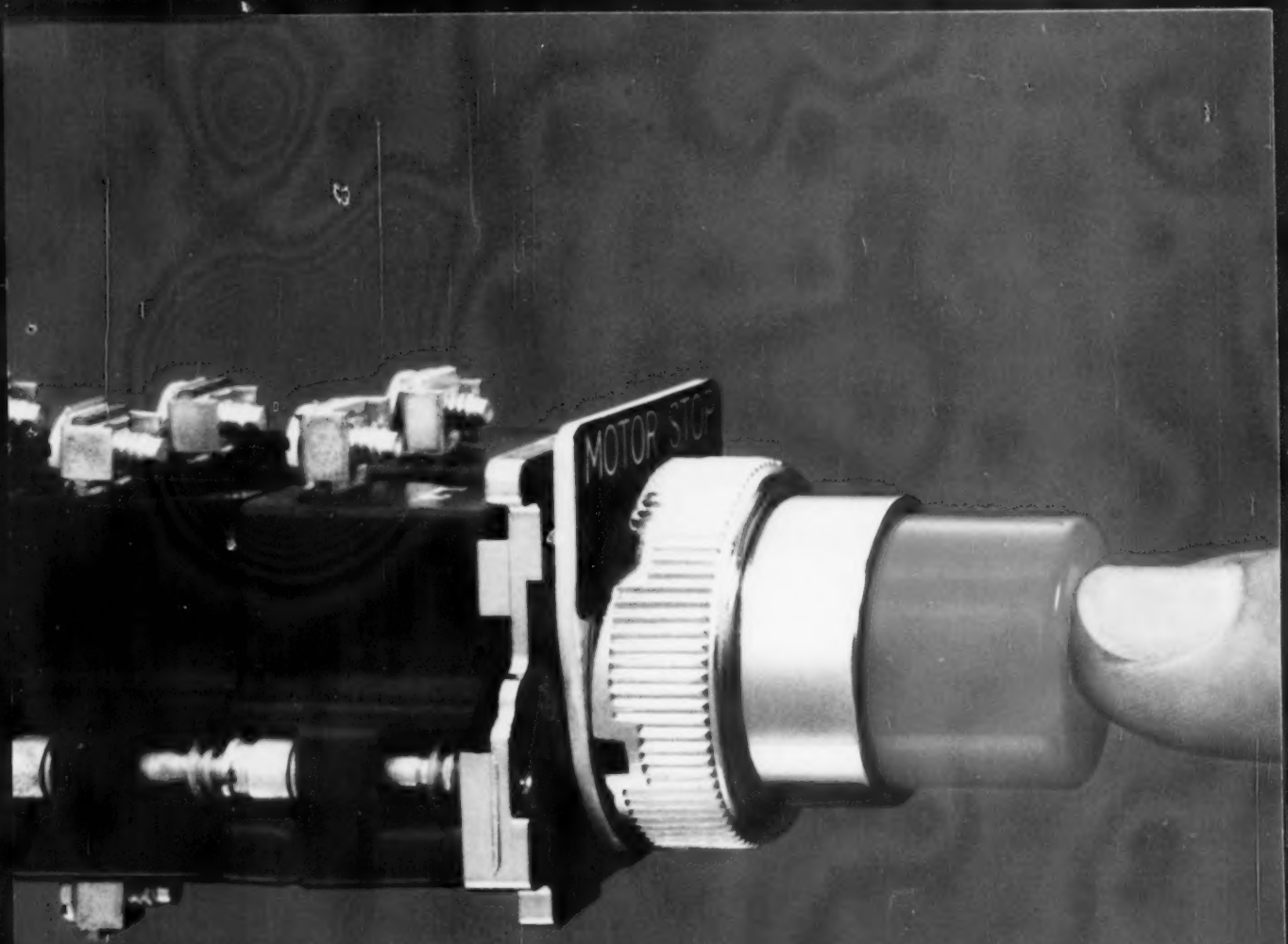
Get all the facts by sending for the colorful brochure, "MASTER DESIGN" which tells you all about the Cutler-Hammer line. Ask for Pub. LO-104.

What's new at Cutler-Hammer? You can see the newness in the products coming from Cutler-Hammer, like the new smaller pushbuttons; in the new manufacturing facilities; in the new engineering ideas. All to give you better service today and in the future. Contact the nearest Cutler-Hammer sales office or your Cutler-Hammer distributor.

WHAT'S NEW? ASK...

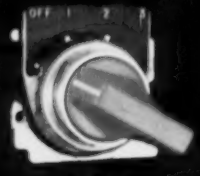
CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.



NEW ILLUMINATED PUSHBUTTON. Newest addition to the versatile line.

YOU CAN GET ALL THESE TYPES OF CONTROL UNITS



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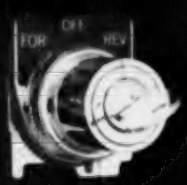
ROTO-PUSH

STANDARD

RESISTOR LIGHT



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how PARISH CUT COSTS, saved time for another manufacturer

problem: A big user of wire cable needed wire reels requiring close parallel tolerances between heads in large quantities, at low cost—and fast!

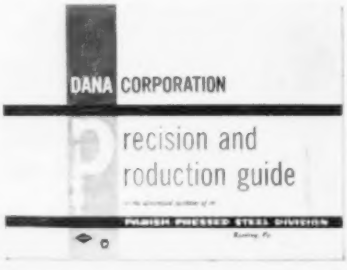
solution: Parish engineers quickly blue-printed the problem and production specialists went to work. Soon Parish's skilled craftsmen, using the most modern precision machinery, were turning out 50,000 reels a month . . . meeting every specification perfectly, and on time.

Parish specializes in solving production problems involving metal parts of all sizes, shapes, and forms. It is equipped to mass-produce precision parts at reasonable cost.

Perhaps Parish can help you • Write or telephone next time you have a parts production problem.

Bolts were welded to heads of wire reels to prevent back-out when reel is in high-speed operation. Main illustration shows how each reel was carefully tested before being shipped.

Write for your copy of this illustrated booklet describing the diversified facilities available to you at Parish.



PARISH
PRESSED STEEL
DIVISION OF DANA CORPORATION • READING, PENNSYLVANIA

We and FDR

Sir—On p. 152 of your Dec. 15 issue of The IRON AGE there is a cartoon. What appears to be Franklin D. Roosevelt in a chair is out of

place. He never knew the word "we." Also, he never could understand the fact that "we can't afford it."—E. W. Lawler, Lawler Co., Metuchen, N. J.

Following Suit

Sir—I noticed in a recent "Letters from Readers" column in The IRON AGE that you have available a booklet entitled "An Interpretive Report on the 1959 Steel Strike." This booklet includes the strike's issues, implications, and impact. Please send me a copy of this booklet if possible.—Charles McCrory, Union City, Calif.

▪ **Watch your mailbox.—Ed.**

Misplaced

Sir—In the column "Letters from Readers" appearing in the Dec. 22 issue there is a letter under the heading of "Timely Comments" which makes reference to one of your editorials entitled "Fighting Communism: Why Is It So Difficult?" Apparently I missed that issue of your magazine as I have no record of it in my file and no recollection of reading this editorial.

It would be very much appreciated if you would send me a copy of this particular editorial, as I believe it would be one that I would like not only to read but to keep in my files.—R. P. Guidford, Westinghouse Electric Corp., Philadelphia, Pa.

▪ **A copy of this editorial has been sent.—Ed.**

Misses Cartoon

Sir—May I say how much I miss the "Bull of the Woods" cartoons. As one who spent 15 years in the workshop, starting in the mid-1920's, I was interested to note the similarity of conditions and everyday happenings in the shops of America and England. The cartoonist must have had an intimate knowledge of the mechanic's life. Will his cartoons be published in book form? If so, I must get one. —G. F. Bruton, London.

▪ **Cartoonist J. R. Williams, creator of "Bull of the Woods," has been dead for some time now. You might write to the Newspaper Enterprise Assn., 1200 W. Third St., Cleveland 13, O., regarding any publication in book form.—Ed.**

Where to Go

Sir—In the "Techfront" section of one of your recent issues I noticed a short paragraph on high temperature "Metal Forming Lubricant." I would appreciate information as to the source where it can be procured.—J. L. McCabe, General Electric Co., Cincinnati, O.

▪ **For further information contact the Alpha - Molykote Corp., 65 Harvard Ave., Stamford, Conn. —Ed.**

W. C. "Bill" Pine, our chief metallurgist says . . .

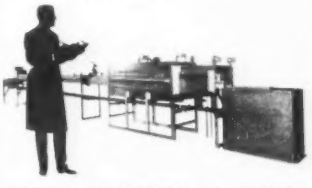
production-proved LAC-200 Series furnaces pay dividends on precision

BRAZING

Talk about controlled heat . . . easy operation . . . versatility . . . economy — and you're describing a Hayes Model LAC-200 Series Conveyor Brazing Furnace.

MULTI-ZONE HEAT CONTROL permits exact settings of temperature profiles — for quality work on each brazing, alloying, metal bonding or soldering cycle. When working with parts of unequal section, a pre-heat zone insures stabilized heat throughout the mass.

CONSTRUCTION MATCHES THE JOB. If an exothermic atmosphere is to be used, open chamber construction reduces equipment cost. For more refined atmospheres, muffles are available, which provide a baffling action to prevent creeping of temperature profiles.



WORK HANDLING IS EASIER, too, with a Hayes Model LAC-200 Series Furnace. Loading tables combine with constant belt feed to make this a remarkably high-production unit, per dollar cost and per foot of floor space.

VERSATILITY COUNTS. While designed for brazing, your Hayes furnace can double for annealing, hardening, and other heat treat operations. It's a bull for work!

WHATEVER YOUR BRAZING NEED — from silver (1100°F range) to platinum (3400°F range with type M-Y or Vacuum Furnaces), Hayes know-how in equipment and engineering can come up with a RESULTS GUARANTEED answer . . . tested in our lab, on full-production equipment . . . proven by scores of successful installations in industry. Bulletin 5711A gives LAC details. For your copy, write C. I. Hayes, Inc., 821 Wellington Ave., Cranston 10, Rhode Island.

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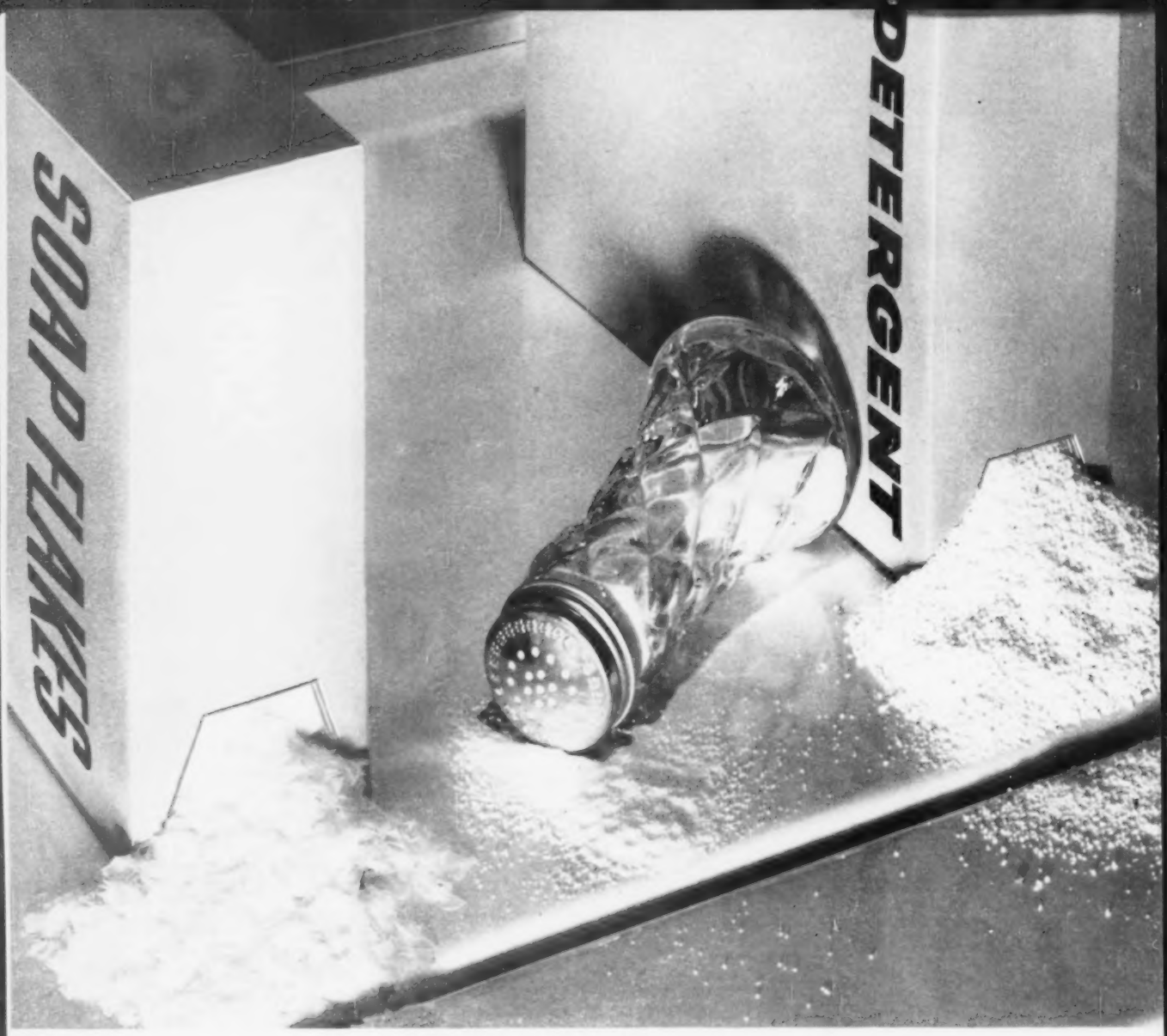
It pays to see Hayes for metallurgical guidance, lab. facilities, furnaces, atmosphere generators, gas and liquid dryers, Pow-R-Trol (TM) control units.



The finish that stands up under spills

Proved in laboratories and thousands of laundry rooms . . . Glidden NU-PON primer and NUBELITE enamel provide greatest resistance to the spills and splashes of laundry products.

Whatever your finishing requirements, Glidden will formulate a finishing schedule to give you exactly the protection you specify to meet any service conditions—corrosion, staining, impact, abrasion, heat and cold.

Your Glidden salesman can give you full information on the best Glidden metal finishing system for your particular product.

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FINISHES FOR EVERY PRODUCT

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No matter what your products, process, or problem, Glidden finishes plus Glidden Technical Service can provide the answer.

FATIGUE CRACKS

Reader to the Rescue

Many requests from readers cross our desk each week and, unfortunately, we find it impossible to fill all of them. Not too long ago we received such a request from C. D. Hicks of St. Louis. Mr. Hicks wanted copies of Tom Campbell's editorials for 1959 and 1960 and our files were found wanting in this respect.

However, a letter this week may be the answer for Mr. Hicks. For obvious reasons, it was also mail we enjoyed opening. Here's a portion of the letter:

Sir—It has been my good fortune to have kept the 1960 editorials and a good many for the year 1959. If you will have Mr. Hicks contact me, I would be very happy to loan them to him if he would like to make photostats.

For some time it has been my intention to write to try to express my appreciation and thanks to Mr. Campbell for these fine editorials with their deep understanding of our nation's problems. Perhaps through Mr. Hicks' request, a better way can now be shown of the high esteem in which the thoughts and counsel of this man are held. —George L. Culp, 3381 Strawberry Lane, Port Huron, Mich.

Trouble to the North?

Here's one of our favorite pictures of Editor-in-chief Tom Campbell. In fur hat and heavy coat, he's talking with Dr. Ab Moss, of the Iron Ore Company of Canada. The site is on the border between Quebec and Labrador, at one of the company's new developments. Temperature not disclosed.

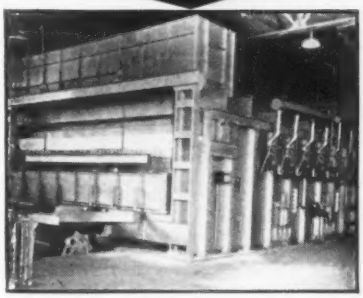
What's Tom doing there? He's no stranger to Canada, nor to the new ore developments far to the north. From time to time over the years, he has kept IRON AGE readers posted on what's doing north of the border.

This time, the news may not be all cheerful. We've all heard disturbing comments on deterioration of relations with Canada.

For Tom's analysis of the situation, turn to p. 50 for his answer to the question, Canada: Trouble to the North?

AT THE SCENE: Equipped for the weather, IRON AGE Editor-in-Chief Tom Campbell (right) visits Canada to get this week's article analyzing U.S. relations with Canada. For the story see p. 50.

FIRST CHOICE FOR PIPE ANNEALING



R-S CAST IRON PIPE ANNEALING FURNACES USED BY EVERY LEADING PIPE FOUNDRY

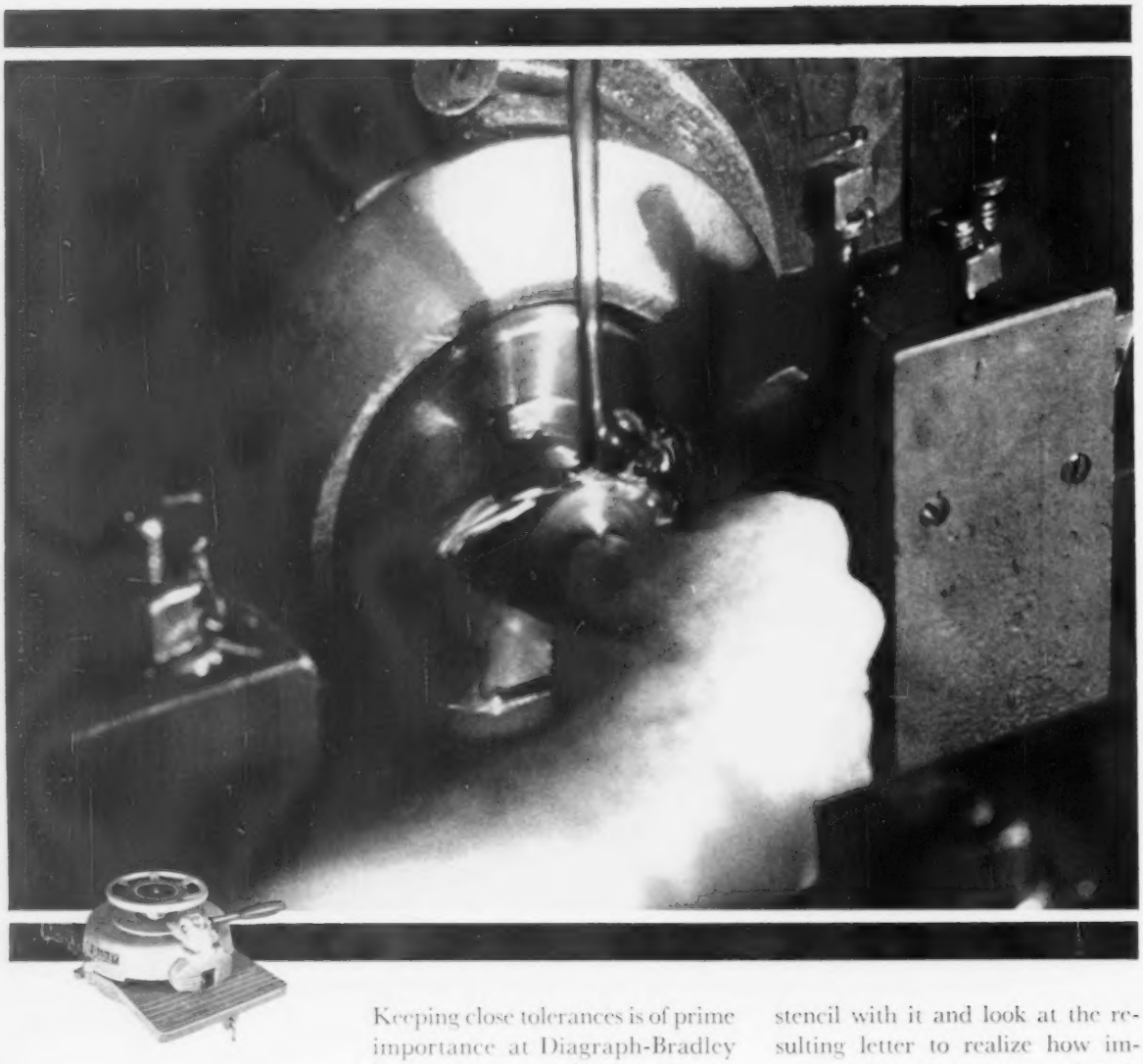
For more than 35 years leading producers of centrifugal cast iron pipe have relied on chain conveyor type annealing furnaces designed and built by R-S.

R-S experience goes back to the first centrifugal cast iron pipe produced in this country more than 35 years ago. Since then cast iron pipe annealing furnaces have been a specialty with R-S engineers. Their experience and development of furnaces to meet the needs of annealing cast iron pipe has kept pace with the industry. Today, R-S pipe annealing furnaces offer greater uniformity of heating through all ranges and precision controlled cooling.

R-S pipe annealing furnaces range in capacities from 15 to 35 tons per hour. Write for complete information on the newest developments in centrifugal cast iron pipe annealing by R-S.

R-S FURNACE COMPANY, INC.
NORTH WALES, PA.

R-S FURNACES



COOL CUTS

Keeping close tolerances is of prime importance at Diagraph-Bradley Industries, Inc., of Herrin, Illinois, leading manufacturer of stencil machines and accessories. One of the ways this is accomplished is by keeping cutting edges cool.

At Diagraph-Bradley stencil punches must be cut and held within .0005 of an inch—a fine point of precision Diagraph-Bradley attributes to the cooling and lubricating effect of Cities Service Chillo 10 cutting oil.

"You have only to take a Diagraph-Bradley machine," says one of the company officials, "cut a stencil with it and look at the resulting letter to realize how important the right cutting oil is to our production."

Cities Service Chillo 10 oil is a sulphochlorinated oil. The concentrations of sulphur and chlorine are stabilized by a special process, assuring uniformity of action through the entire cutting operation.

That's why, with Cities Service Chillo 10 cutting oil, work is always more accurate, clean and cool!

For full information call your nearest Cities Service office or write Cities Service Oil Company, Sixty Wall Tower, N.Y. 5, N.Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

COMING EXHIBITS

International Heating & Air-Conditioning Show—Feb. 13-16, International Amphitheatre, Chicago. (International Exposition Co., 480 Lexington Ave., New York 17.)

MHI Pacific Coast Show—Feb. 22-24, Cow Palace, San Francisco. (Material Handling Institute, Inc., One Gateway Center, Pittsburgh 22.)

Western Metal Show — March 20-24, Pan Pacific Auditorium, Los Angeles. (American Society for Metals, Metals Park, Novelty, O.)

National Packaging Show — April 10-13, Lakefront Exposition Hall, Chicago. (American Management Assn., 1515 Broadway, Times Square, New York 36.)

Powder Metallurgy Show — April 24-26, Hotel Sheraton-Cleveland, Cleveland. (Metal Powder Industries Federation, 60 E. 42nd St., New York.)

Castings Show—May 8-12, Brooks Hall, San Francisco, Calif. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Design Engineering Show—May 22-25, Cobo Hall, Detroit. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

MEETINGS

JANUARY

Truck-Trailer Manufacturers Assn., Inc.—Annual convention, Jan. 29-Feb. 1, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters 710 Albee Bldg., Washington, D. C.

American Institute of Electrical Engineers—Winter general meeting, Jan. 29-Feb. 3, Statler-Hilton Hotel, New York. Institute headquarters, 33 West 39th St., New York.

Steel Kitchen Cabinet Manufacturers Assn.—Midyear meeting, Jan. 31, Sheraton Towers Hotel, Chicago. Association headquarters, 910 Park Bldg., Cleveland.

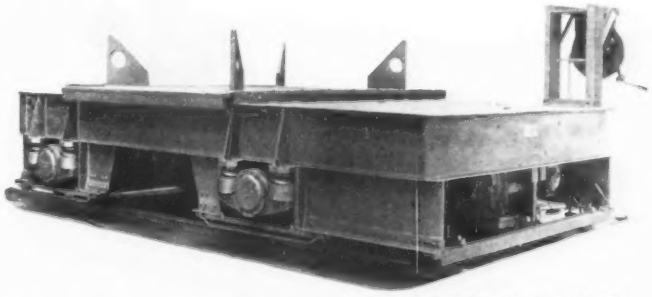
Tape Recording

Chart Recording

Atlas Builds Electronic Scales for-

Blast furnace scale cars
Coke weighing
Scrap bucket charging

This 60-ton scale car handles scrap buckets from the scrap yard to electric furnaces. For safety, the operator controls the car movement from a remote location. The electronic scale dial is mounted where the crane operator can watch it while loading the car.



60-Ton Electronic Scale Car

ATLAS CAR & MFG. CO.

1100 IVANHOE ROAD / CLEVELAND 10, OHIO

THERMAL
INERT GAS GENERATORS

Using the Thermal Sub-X Process

THERMAL utilizes unique principles of design to provide refineries, chemical processors, metallurgical plants, and other industrial users with a source of inert or purge gases that is compact in size and provides high outputs for low initial cost. Standard outputs range from 2,000 scfh to 60,000 scfh.

A 30,000 scfh Gas Fired Generator Ready for Use

SUBMERGED EXHAUST OF COMBUSTION PRODUCTS makes feasible the use of low-cost or contaminated water as coolant without concern over fouling of surfaces. The tank of water through which the gases pass provides an unusual degree of safety. Heat transfer efficiency is extremely high.

REFRACTORY IS ELIMINATED and maintenance costs reduced through the use of the high heat release THERMAL burner which can be fired with gas, distillate oil, or dual fuel. Units are supplied as a complete package and include all control and safety equipment.

For detailed information write for Bulletin #114-B

THERMAL

Thermal Research & Engineering Corp.

CONSHOHOCKEN • PENNSYLVANIA

REPRESENTATIVES IN PRINCIPAL CITIES

Other Thermal Products & Services:

Gas, Oil & Combination Burners
Heat Exchangers
Air Heaters
Submerged Combustion
Combustion & Heat Transfer Equipment

MEETINGS

FEBRUARY

American Foundrymen's Society—Wisconsin regional foundry conference, Feb. 9-10, Hotel Schroeder, Milwaukee. Society headquarters, Golf & Wolf Rds., Des Plaines, Ill.

National Assn. of Manufacturers—Meeting, Feb. 15-17, The Riviera Hotel, Palm Springs, Calif. Association headquarters, Two E. 48th St., New York.

Assn. of Iron & Steel Engineers—Western meeting, Feb. 27-Mar. 1, Hotel Statler, Los Angeles. Association headquarters, 1010 Empire Bldg., Pittsburgh.

MARCH

Malleable Founders Society—Technical and Operating conference, Mar. 1-2, Pick-Carter Hotel, Cleveland. Society headquarters, 781 Union Commerce Bldg., Cleveland.

Can Manufacturers Institute, Inc.—Annual & board meeting, Mar. 6, Waldorf-Astoria, New York. Institute headquarters, 821 15th St., N. W., Washington, D. C.

Steel Founders' Society of America—Annual meeting, Mar. 11-14, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

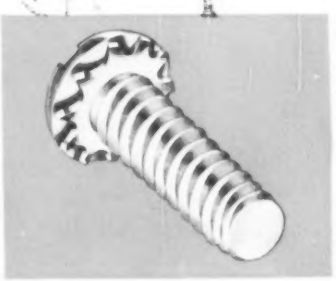
Industrial Diamond Assn. of America, Inc.—Annual meeting and convention, Mar. 13-17, Hollywood Beach Hotel, Hollywood, Fla. Association headquarters, Box 175, Pompton Plaines, N. J.

Society for Non-Destructive Testing—Western regional convention, Mar. 20-24, Ambassador Hotel, Los Angeles. Society headquarters, 1109 Hinman St., Evanston, Ill.

American Hot Dip Galvanizers Assn., Inc.—Annual meeting, Mar. 22-24, The Royal Orleans, New Orleans. Association headquarters, 5225 Manning Place, N. W., Washington, D. C.

Sems Save Production-line Time and Money

Sems are pre-assembled lock washer and screw fastening units. They eliminate separate handling of washers and screws forever . . . make possible a faster, more efficient, more economical assembly-line operation. When applied with a hopper-fed screw driver Sems yield even greater assembly-time savings. Choose from the wide variety of Sems styles and sizes available at the convenient sources listed below.



Specify Shakeproof® Lock Washers when ordering Sems. They're specially engineered for mechanical pre-assembly and their triple locking action assures a positive, lasting lock for improved product performance

38 Sources throughout the nation for fast, efficient service

ACCURATE THREADED FASTENERS, INC.
Chicago 19, Illinois

AMERICAN SCREW COMPANY
Willimantic, Connecticut

ANCHOR FASTENERS, INC.
Waterbury, Connecticut
Cleveland 5, Ohio

THE BLAKE & JOHNSON CO.
Waterville 14, Connecticut

BUTCHER & HART MFG. CO.
Altoona, Pennsylvania

CENTRAL SCREW COMPANY
Chicago 9, Illinois
Keene, New Hampshire
Frankfort, Kentucky

CONTINENTAL SCREW CO.
New Bedford, Massachusetts

CRESCENT SCREW PROD. CO.
Rockford, Illinois

ECONOMY SCREW CORP.
Chicago 14, Illinois

ELCO TOOL & SCREW CORP.
Rockford, Illinois

FEDERAL SCREW WORKS
Detroit 10, Michigan

GREAT LAKES SCREW CORP.
Chicago 27, Illinois

H. M. HARPER CO.
Morton Grove, Illinois

HARVEY HUBBELL, INC.
Bridgeport 2, Connecticut

INDIANA METAL PRODUCTS DIVISION, TEXTRON INC.
Rochester, Indiana

LAKE ERIE SCREW CORP.
Cleveland 7, Ohio

THE LAMSON & SESSIONS CO.
Cleveland 2, Ohio

LEHIGH METAL PRODUCTS CORP.
Cambridge 42, Massachusetts

MID-AMERICA FASTENERS, INC.
Franklin Park, Illinois

MIDLAND SCREW CORP.
Chicago 32, Illinois

NATIONAL LOCK COMPANY
Rockford, Illinois

THE NATIONAL SCREW & MFG. CO.
Cleveland 4, Ohio
Los Angeles 22, California

PARKER-KALON DIVISION, GENERAL AMERICAN TRANSPORTATION CORP.
Clifton, New Jersey

PHEOLL MANUFACTURING CO. INC.
Chicago 50, Illinois

PROGRESSIVE MFG. CO., DIV. OF TORRINGTON CO.
Torrington, Connecticut

RELIANCE DIVISION, EATON MANUFACTURING CO.
Massillon, Ohio

REPUBLIC STEEL CORP.
Bolt & Nut Division, Cleveland 13, Ohio

RING SCREW WORKS
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ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

RUSSELL BURDSALL & WARD BOLT & NUT CO.
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SCOVILL MANUFACTURING CO
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SEMS DIVISION, TEXTRON INC.
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SHAKEPROOF DIVISION, ILLINOIS TOOL WORKS
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THOMPSON-BREMER & CO.
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TRIPLEX SCREW CO.
Cleveland 4, Ohio

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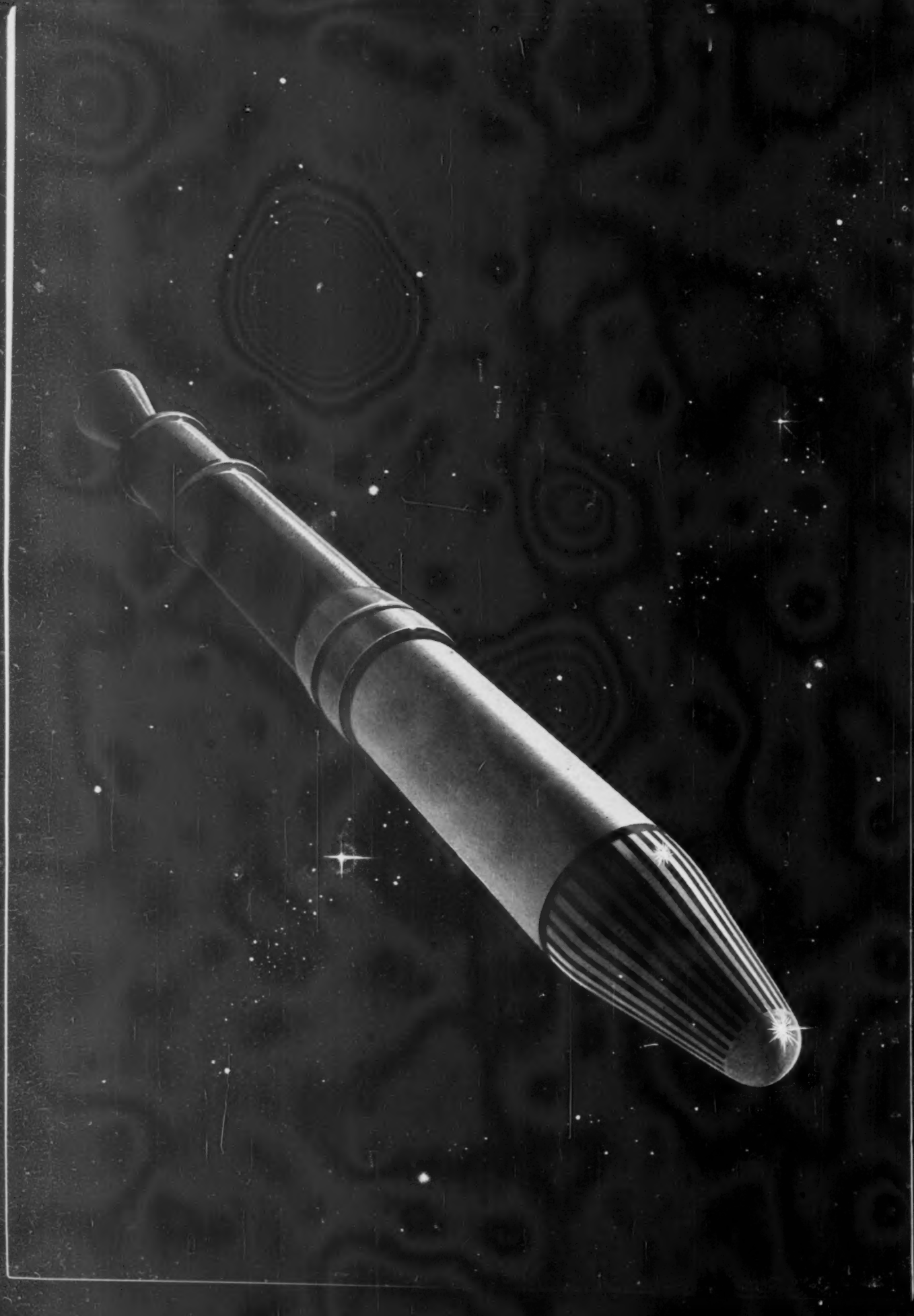
WALES-BEECH CORP.
Rockford, Illinois

For information on SEMS sources in Canada, contact
CANADA ILLINOIS TOOLS LTD. SHAKEPROOF-FASTEX DIVISION
Toronto, Ont., Canada

Sems itw

pre-assembled screw and lock washer

SEMS is a development of Illinois Tool Works, Chicago



395 MILLION MILES AGO

. . . Republic Stainless Steel flashed into the Van Allen belts with Explorer I

On January 31, 1958, at 10:48 PM, EST, America's first satellite was hurled into orbit from Cape Canaveral, Florida, by the U.S. Army. Explorer I is still orbiting. It has produced the most important space discovery to date—the Van Allen belts of radiation.

Explorer I's nose cone was fabricated from Republic Stainless Steel, Type 430, by the Lodge and Shipley Company, Cincinnati, Ohio. They used the Floturn Process to produce specified deviations in wall thickness.

Much has happened at Republic Steel since the launching of Explorer I. Republic has the *largest capacity for production* of vacuum melted metals . . . is the *largest producer* of steel for cold extrusion and cold heading . . . the *only source* for complete line of stainless sheets up to 60" wide . . . a *new source* for complete line of PH Stainless Steels.

Today—three years later—Republic continues to be the world's largest producer of stainless and alloy steels.

REPUBLIC STEEL

Cleveland 1, Ohio

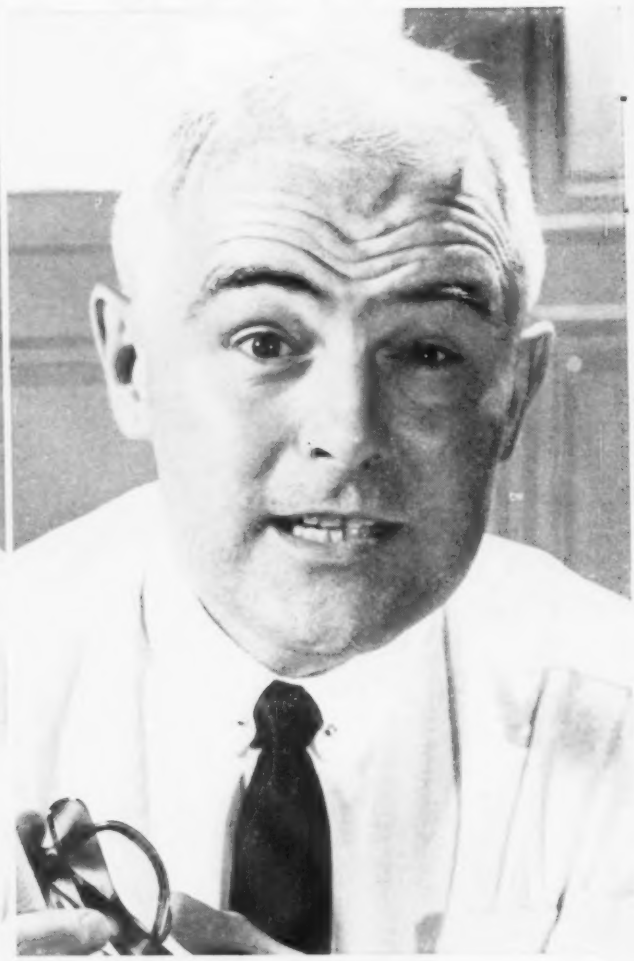
World's Leading Producer of Space Age Metals

Strong, Modern, Dependable

GOODYEAR

Hose? Goodyear

THE KIND I NEED?
(No matter how tough or unusual your application or what type hose it calls for—*Goodyear has the answer!)*



WHEN I NEED IT?
(When you need hose in a hurry—locally available right from distributor stocks—*Goodyear has the answer!)*

FOR THE RIGHT HOSE... AT THE RIGHT PLACE...
CALL YOUR GOODYEAR DISTRIBUTOR... first in

Lots of good things come from **GOOD**

Has All the Right Answers!

TOUGH AS I NEED IT?
(For the extra ruggedness, extra dependability and extra safety of real quality hose–*Goodyear has the answer!)*

SPECIAL HELP WHEN I NEED IT?
(Call for the advice of an expert like the G.T.M. – Goodyear Technical Man – and *Goodyear has the answer!)*

AT THE RIGHT TIME... AT THE RIGHT PRICE...
service with all industrial rubber products

Or write Goodyear, Industrial Products Division, Akron 16, Ohio

GOODYEAR INDUSTRIAL PRODUCTS

PRODUCT BY ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

PROCESSING BY NSE

PRE-PAINT PROTECTION BY

AMCHEM ALODINE*

A typical Alcoa Alumature building siding installation is shown in the clean, functional lines of the Robinson Building, Elyria, Ohio.

How Amchem Pre-Paint Treatment, NSE Processing Help Put the "Lure" in Alcoa Alumalure!**

Alcoa Alumalure baked enamel finish on industrial roofing and siding sheet has made a startling impact in building circles. A low cost, decorative, maintenance-free exterior wall surface, available in 11 colors, it is widely used for new buildings as well as remodeling older structures.

Key to Alumalure success—strong, light aluminum and design innovations by Alcoa . . . precision finishing by NSE Signs & Stampings . . . unmatched protection and paint adhesion by Amchem Alodine chemicals.

With color matching standards a prime-requisite, assurance of paint adhesion on Alumalure sheets is a vital necessity to protect customers who buy the product, months later reorder and expect exact color match. Results to date on millions of square feet of Alumalure processed—no paint failure or rejects involving chemical treatment by Alodine!

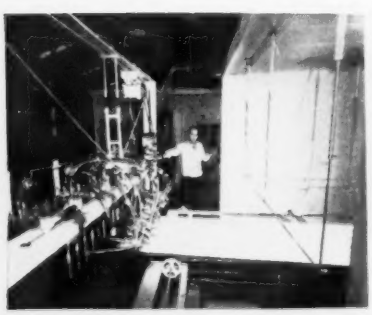
Rigid quality control has resulted in a fine production record for Alumalure at NSE's Birmingham plant.

Full time NSE and Alcoa inspectors watchdog every foot of sheet throughout the production cycle. For chemical pre-treatment Alcoa specifies high standards of Government Specification MIL-C-5541. NSE selected and uses Alodine for "the best metal preparation treatment you can find." NSE management states emphatically, "There's no question about what Alodine has done for the preparation of aluminum for painting. We don't have paint failures. We don't have customer rejects."

An "extra" plus from Alodine—Alcoa finds additional customer appeal in the gold coat Alodine creates on Alumalure backing which provides a pleasing antique decorative finish for building interiors.

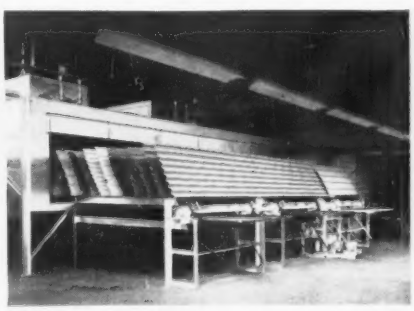
If you want—corrosion resistance, lasting paint adhesion, rejects slashed to the vanishing point and sales ammunition that helps sell products—investigate Alodine, the industry's first and today's standard conversion coating chemical for aluminum!

* Amchem's trademark for its conversion chemical coating for aluminum.
** Trademark of Aluminum Company of America.



After treatment with Alodine, a ribbed siding sheet is painted employing Ransburg electrostatic paint equipment. NSE can run two sheets in tandem, accomplishing 60 lineal feet per minute painting.

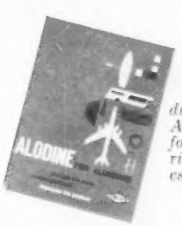
NSE Executive Vice-President John Montgomery (left), Plant Manager R. Cater Lee, and Alcoa (quality standards) specialist J. Shea (right), inspect "3D" Alumalure sheet.



The massive equipment shown here is an ultra-modern, newly installed Lanly oven for handling Alumalure sheets.

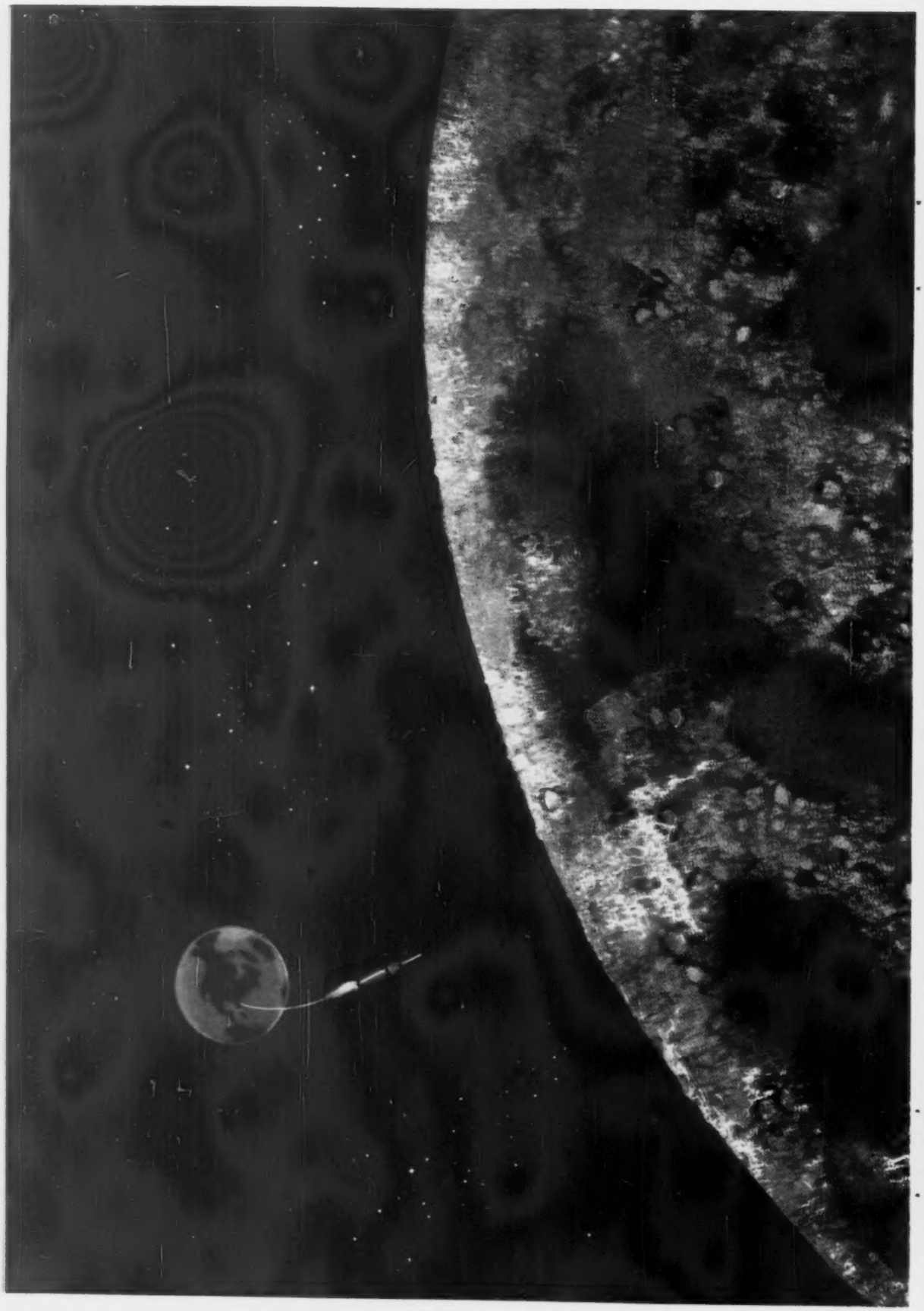
AMCHEM

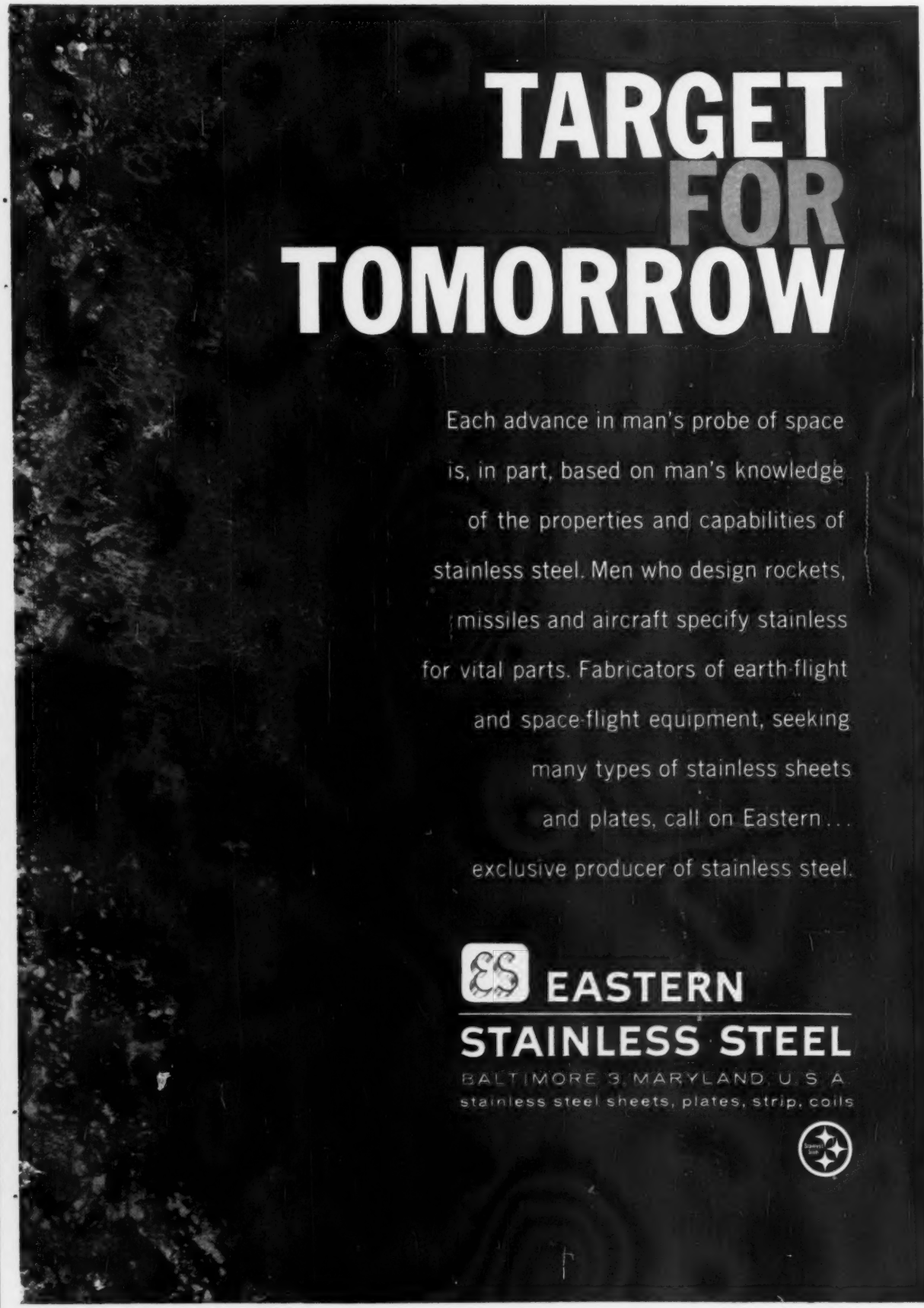
ALODINE



Write for free bulletin 1421C, outlining the uses and many different types of Alodine available for aluminum fabricators and processors.

Amchem is a registered trademark of
AMCHEM PRODUCTS, INC. (Formerly American Chemical Paint Co.)
AMBLER, PA. • Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.




TARGET
FOR
TOMORROW
Each advance in man's probe of space is, in part, based on man's knowledge of the properties and capabilities of stainless steel. Men who design rockets, missiles and aircraft specify stainless for vital parts. Fabricators of earth-flight and space-flight equipment, seeking many types of stainless sheets and plates, call on Eastern... exclusive producer of stainless steel.
EASTERN
STAINLESS STEEL
BALTIMORE 3, MARYLAND, U.S.A.
stainless steel sheets, plates, strip, coils

THE
TIMKEN
ROLLER BEARING
COMPANY

REPORTS SAVINGS...

7 TO 1 REDUCTION IN... DIAMOND WHEEL COSTS

4 TO 1 REDUCTION IN... GRINDING TIME

WITH

ANOCUT
ELECTROLYTIC GRINDING

THE TIMKEN ROLLER BEARING COMPANY

CANTON 6, OHIO, U.S.A.
TELEPHONE: GLENDALE 2-4511
CABLE ADDRESS "TIMROSCO"

June 3, 1960

Mr. C. R. Stroupe
Vice President
ANOCUT ENGINEERING COMPANY
631 W. Washington Boulevard
Chicago 6, Illinois

Dear Mr. Stroupe:

We are pleased to report that The Timken Roller Bearing Company now has a total of nine Anocut units in operation in the Canton, Columbus, and Bucyrus Divisions.

Seven of these are 300 and two are 600 ampere units. The seven 300 ampere units are used on 6" x 18" Norton Surface Grinders for chip breaker grinding operations. Three of these units are in a dual setup whereby a switch kit is used to switch the Anocut unit to a Porter-McLeod Cut-Off Machine. These cut-off machines are used to salvage chipped tools and cut carbide to special lengths.

The two 600 ampere units are used on Hammond SCE-10 dual table oscillating grinders. On these latter machines, we are, for example, removing .045" of solid carbide in 45 sec. from a tool approximately ½" square, processing two tools simultaneously.

We are realizing a savings of 7 to 1 in diamond tool costs, and a reduction in grinding time of approximately 4 to 1.

C. A. Laase
Mechanical Engineering Department

OFF-HAND GRINDING SINGLE POINT TOOLS ON HAMMOND 10" DUPLEX ELECTROLYTIC GRINDER.

ELECTROLYTIC CHIPBREAKER GRINDING ON NORTON SURFACE GRINDER.

You're Invited...

TO VISIT THE ANOCUT DISPLAY CENTER AND PLANT WHEN IN CHICAGO. JUST OUTSIDE THE LOOP.

ANOCUT T.M. Reg.
ENGINEERING COMPANY
631 WEST WASHINGTON BLVD. • CHICAGO 6, ILL.
PHONE STATE 2-5480

Ore importers... save money via Portland (Oregon) Harbor

Terrific savings by faster discharging of ores and ore concentrates await importers . . . on completion of Portland Public Docks' giant new bulk unloader later this year.

Geared for direct transfer from ship to rail or truck, this straight-line bulk unloader has a rated capacity of 900 tons-an-hour.

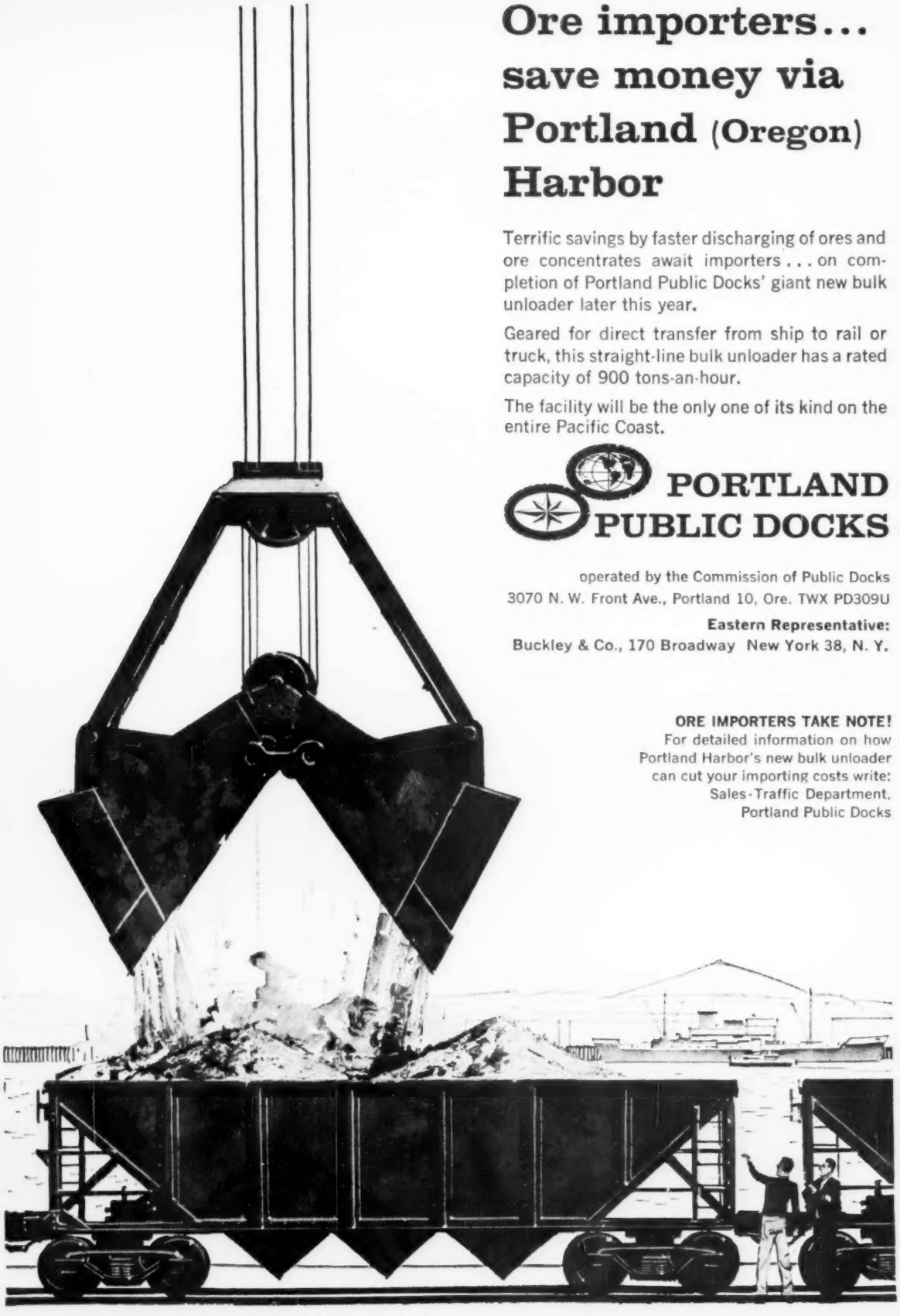
The facility will be the only one of its kind on the entire Pacific Coast.

PORTLAND PUBLIC DOCKS

operated by the Commission of Public Docks
3070 N. W. Front Ave., Portland 10, Ore. TWX PD309U

Eastern Representative:
Buckley & Co., 170 Broadway New York 38, N. Y.

ORE IMPORTERS TAKE NOTE!
For detailed information on how Portland Harbor's new bulk unloader can cut your importing costs write: Sales-Traffic Department, Portland Public Docks

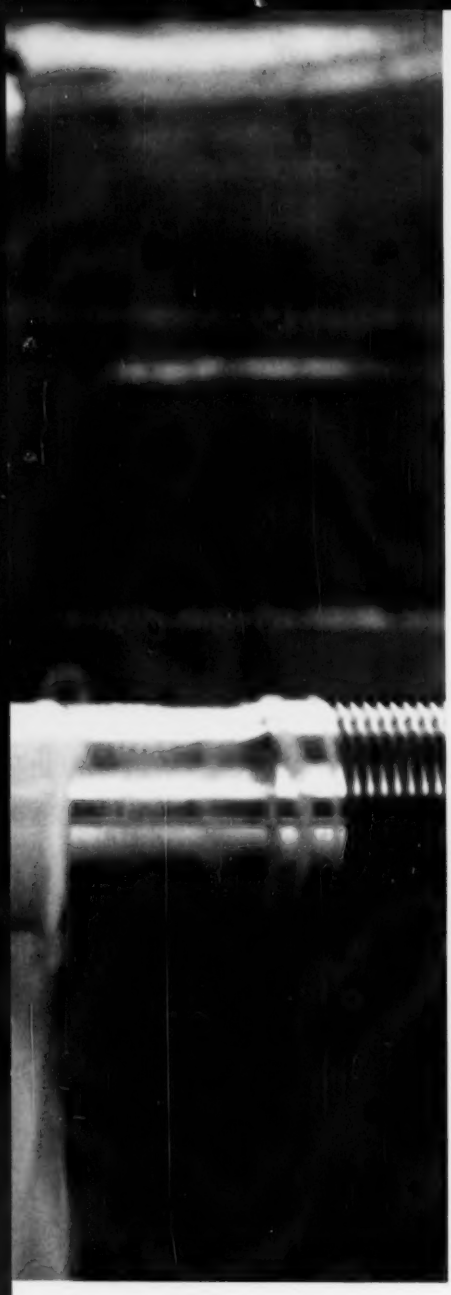


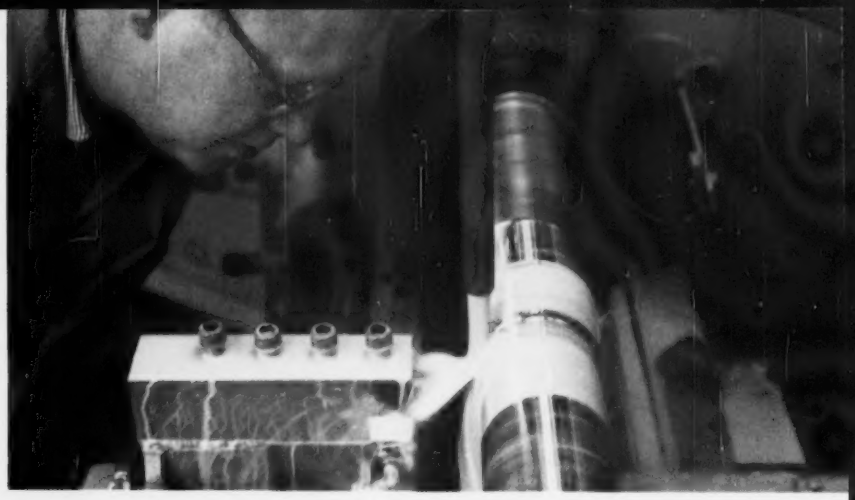
When the job calls for an emulsifiable Gulfcut® Heavy Duty Soluble Oil...

Gulfcut Heavy Duty Soluble Oil combines the ideal lubricating qualities of oil and cooling ability of water with special anti-weld additives that permit heavier cuts at higher speeds. It contains a special rust inhibitor that protects both product and equipment.

Superior finishes can be attained with Gulfcut Heavy Duty Soluble. It has been used to produce a 5-micron finish on steel—comparable to that of plate glass. On many tough jobs where other emulsifiable coolants have failed, Gulfcut Heavy Duty Soluble has delivered—even on low machinability metals.

CUTS MACHINING COSTS—With Gulfcut Heavy Duty Soluble Oil, a mixture of 1 part to 25 parts of water provides good cooling and superior lubrication. It has performed well even in mixtures of 1 to 100. In hard water, its excellent emulsion stability prevents separating or gum deposits on wheels, slides, ways or other machine parts. In soft water, a powerful anti-foam agent controls foaming. A germicidal agent counteracts possible rancidity and foul odor.





Lehmann 18" Hydratrol lathe turning 4" Nitralloy 135 modified bar stock. Tool is K7H carbide nitriding steel. Feed .011", depth of cut .100", speed 300 sfm. Coolant is 20% emulsion of Gulfcut Heavy Duty Soluble Oil.

Grinding 2" Type 970 steel gate valve wedges on a surface grinder. Shields removed and operation suspended to show grinding wheel and work pieces in place on stock table. This shop improved production more than 10% with Gulfcut Heavy Duty Soluble Oil.

◀ Norton Type C Cylindrical Grinder grinding SAE 4140 steel connecting rod bolts to 4 micro-inch finish. Speed is 225 sfm, depth of cut .020" with 30" x 1" aluminum oxide wheel. Coolant: Gulfcut Heavy Duty Soluble Oil in a 32:1 emulsion.

coolant, do it faster and better with GULF MAKES THINGS RUN BETTER!

Gulfcut Heavy Duty Soluble Oil can help you cut machining costs, improve production. May we have the opportunity to prove it to you? Just call your nearest Gulf office. Or, write us for literature.

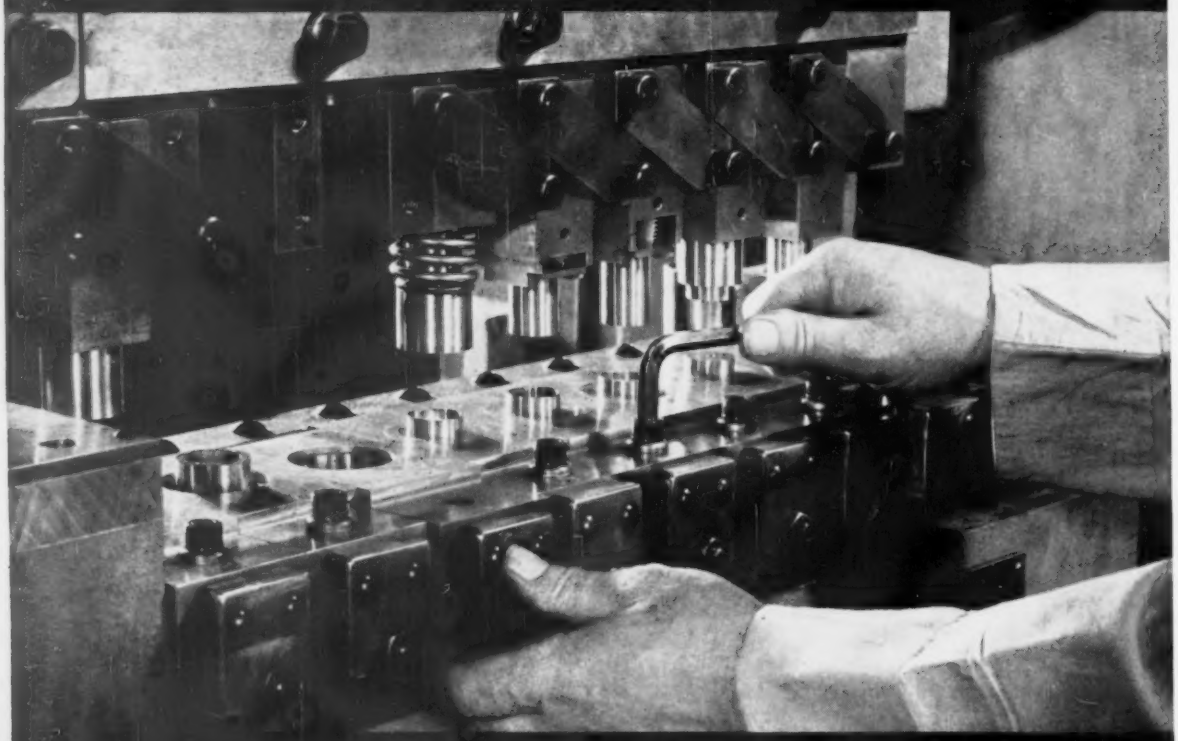
GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

Since this shop began using Gulfcut Heavy Duty ▶ Soluble Oil, coolant service life increased 12 times.

SP-9988

The most expensive rejections: the ones you don't catch!



Once a part "sneaks through" into expensive and time-consuming forming operations, costs skyrocket. That's why Ansco designs films of maximum readability . . . to catch defects in the initial X-ray inspection.

If you are at all concerned about the ones that "sneak through," check Ansco!

Here are four fine Ansco X-ray emulsions to suit your every need: Ansco Superay 'A', fast, high definition film for general purposes. Superay 'B', ultra-fine grain, medium-speed emulsion for maximum detectability. Superay 'C', medium-fine grain and high-speed performance. Superay 'D', designed to provide extremely high speed when used with calcium tungstate screens. Ansco, Binghamton, N. Y., A Division of General Aniline & Film Corporation.

Ansco

Industrial X-ray

Metalworking Newsfront 6

A DELAY IN INVENTORY BUILDING in some metalworking lines is forecast by economist Eliot Janeway. He cites as the cause the possibility of a fall strike in the auto industry. Says Mr. Janeway: "Just as fast as auto strike talk speeds up the movement of cars from dealers to the public, it is bound to slow down the spring movement of steel, aluminum and brass from primary producers to auto plants."

THREE KEY SPACE AGE METALS, molybdenum, columbium and rare earths will be in ample supply through the '60s, says Max Hirsch, president, Molybdenum Corp. of America. A congressional group had earlier cited a growing need for these metals through 1964.

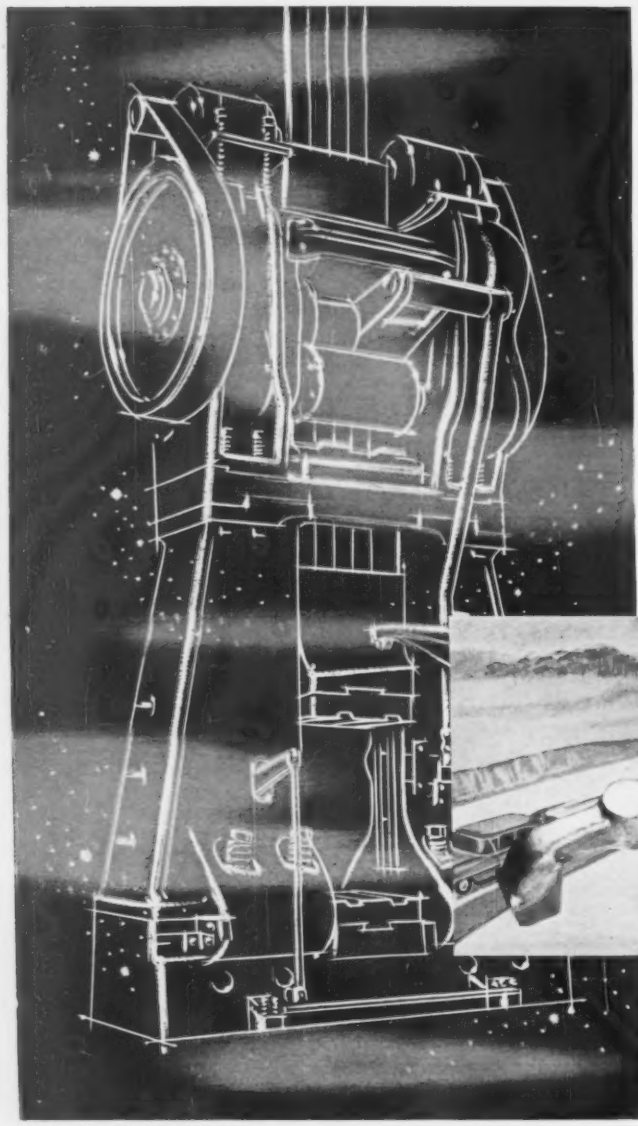
HOW MUCH GOVERNMENT CAN MARKETING STAND, is the name of a new study of the National Assn. of Manufacturers. The study describes the "pattern of attacks directed against the free market system." It states the last Congress introduced some 200 bills calling for controls over such marketing functions as pricing, labeling, dealer relations, sales financing and trade relations.

GROWING DEMAND FOR HEAT TREATED carbon and alloy steel plate may cause foreign and domestic steel producers to invest in more continuous heat-treating units. Steel companies may be forced to meet competition of high-alloy aluminum construction products. Steel mills making plate are investigating.

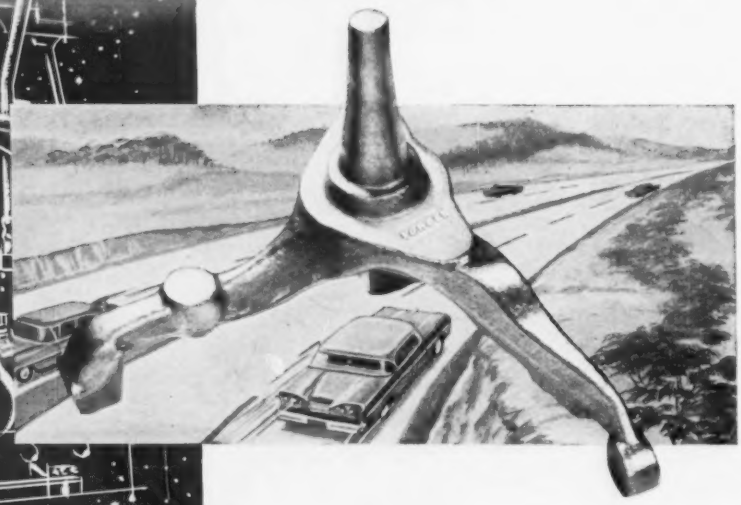
THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a 9.5 pct decrease in November 1960 from October. The November index was 198.9 (1947-49=100) for new bookings.

RETAIL INVENTORIES OF DURABLE GOODS continued their climb in November, according to the Commerce Dept. November 1960 inventories (adjusted) totaled $12.06 billion, up from $11.9 billion in October. November stocks were also up $1.05 billion over November, 1959. Some marketers look to spring sales to thaw these stocks. This would mean continued price pressures.

RAILROAD REFRIGERATION EQUIPMENT is getting a hard second look by Canadian railroads. Most Canadian railroaders in the past have felt refrigeration equipment represented too much capital investment. They have now changed their minds and are looking over available refrigeration systems.



SHOCK-STRENGTH of steering spindle soars by designing it to be forged



Modern board-lift forging hammer

By designing front-end spindles to be forged, automobile and truck manufacturers practically eliminate danger of failure of these vital parts, even under sudden turning stress that can reach thousands of foot-pounds.

Start your designs by planning to use forgings everywhere there's a high degree of stress, vibration, shock, or wear. Forged parts withstand them all better than parts made by other fabrication methods. And forgings have no hidden voids to be uncovered after costly machining hours have been invested . . . the hammer blows or high pressures of the forging process compact the *better* forging metal, make it *even better*.

Write for literature on the design, specification, and procurement of forgings.

When it's a vital part, design it to be FORGED

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Can Nonferrous Markets Hold Up Under New Price Pressures?

After holding up under weakening markets through most of last year, prices finally broke.

Here's an analysis of current markets and of the new pressures exerted on prices.
By F. J. Starin

■ Copper and zinc prices drifted easily through most of 1960—going over 10 months without a change in price.

Copper held in the face of African upheavals (world's largest source) and sagging U. S. markets. Zinc felt pressure from lower-priced imports and poor markets.

But in recent weeks, the price picture has changed. The zinc price has fallen three times. And for a brief period, no U. S. smelter would quote any price at all.

Copper has tumbled 4¢ per lb since late in 1960.

How Stable — Stability in many other nonferrous metals is more apparent than real. The lead price has changed only once in 13 months. But there is trouble ahead since lead is in serious competition for some of its major markets.

And the aluminum industry, to open up new markets and compete with other materials, has pegged the prices of some mill products at nonprofitable levels. For instance, sheet for canmakers is only about 6¢ more per lb than primary ingot. No one in the industry even pretends ingot can be converted for this price.

Aluminum marketing men say they are getting results. But the financial arm of the industry is uneasy, because it knows the industry can't do this sort of thing indefinitely.

Behind the Market — Why are nonferrous markets turning uneasily?

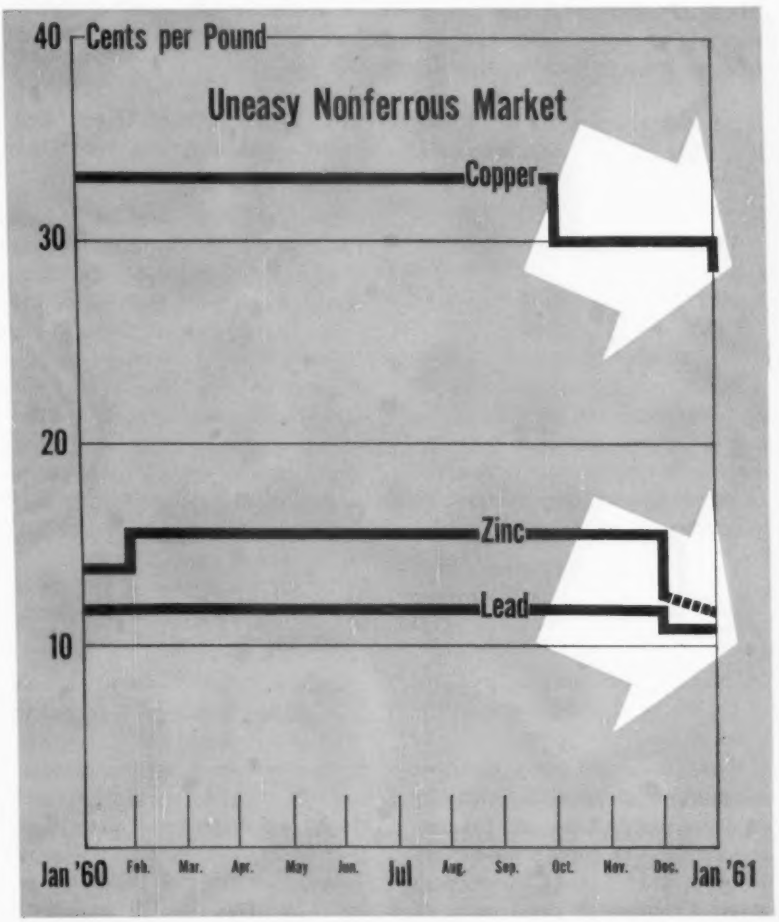
There is a growing list of factors influencing these markets. Through most of 1960, and until just recently, there was a delicate balance of most markets. Just slight changes in any of these factors can upset the balance and start a chain reaction.

Copper is perhaps the best example of the many factors which influence a price.

Just last week, while copper men were reading that world deliveries to fabricators had improved in December, and unsold stocks had decreased slightly, Kennecott Copper Co., one of the world's largest producers, pushed the price down 1¢ per lb.

Who's Surprised?—A sales head of another copper producer said

Nonferrous Prices Falter



MERCHANDISING: Nonferrous metals producers are doing everything they can to improve sales. One example is this 2500-lb block of zinc offered to large-tonnage users by New Jersey Zinc Co.

his initial reaction to the Kennecott move was surprise, because he couldn't see that the pressure on the producers' price was that strong.

Why did Kennecott cut its price? Just a few days before the custom smelters had dropped their price 1¢ per lb.

Custom smeltered copper is made from scrap and purchased ore, and normally fluctuates more than producers' copper. But custom smelter capacity is only about 15 pct of the U. S. total, so it may or may not affect the producers' price.

To Keep the Market—But, one of the major smelters is handling more and more of its own ore, and is, in effect, also a producer. Kennecott felt it would lose some of its share of the market if it did not meet the lower price.

Within a few days after the Kennecott move pounded home the fact of over-supply, Anaconda Co. announced it was cutting production 10 pct at its U. S. and Chilean operations. Kennecott dropped output of its U. S. properties by 13 pct. Kennecott production was not cut in Chile.

World Markets—An analysis of 1960 shows that booming business in Europe helped balance the recession in the U. S. Business is still holding up in Europe. But sales in the U. S. haven't improved as producers had hoped earlier in 1960.

A paradox in this whole nonferrous picture is that a lower price almost never stimulates business. Buyers assume that if the market was weak enough for one drop, it will likely fall again.

But copper, as well as zinc, lead and tin, is also (1) a speculative metal, and (2) a world metal.

Look to London — Anyone who deals in these metals must watch the London Metals Exchange, where they are bought and sold on speculation. In copper, figuring duty and freight, when London is more than 2½¢ under the U. S. price it is more economic to buy there and ship to the U. S. This puts an immediate downward pressure on prices.

Zinc Factors—In zinc, the market is somewhat different. Balancing the weak U. S. market in 1960 were strikes at New Jersey Zinc Co. and Bunker Hill Co., two major U. S. producers.

Both ended at about the same time, pumping 17,000 tons of metal per month on an already teetering market. The price fell.

There are quotas on the amount of zinc and lead which can be imported. But foreign metal almost invariably undersells U. S. metal.

Whenever European prices get 1¢ per lb less than metal delivered on the East Coast, there is strong pressure for a lower U. S. price.

The real turmoil in 1961 began when St. Joseph Lead Co., a major U. S. smelter, felt the effects of some selective discounting by U. S. smelters. St. Joseph promptly offered metal at the average price for the month, less ½¢ per lb discount. After almost a week of no firm price, the discounting ended and the price was set firm at a lower level.

Causes Remain—But the situation that caused the discounting in the first place—lower-priced foreign metal—is still present.

At the beginning of this session of Congress, it looks like the domestic lead and zinc industry may get some help. They have been knocking at the door of Congress for years.

At first there were too many "plans." Last year the industry backed one plan, only to have it vetoed by President Eisenhower. This year, hopes are high, because President Kennedy has said he will help the domestic industry.

Inventory Picture — Underlying the whole uneasy nonferrous market situation is the big question of consumer inventories. It is conceded that consumption of nonferrous metals in 1960 clearly topped shipments as consumers worked down their inventories. Optimists in the industry say consumer inventories are approaching the bottom. This, they hope, will mean an upturn in buying before the overall economy turns up.

Instrument Sales on the Way Up

More Money Spent by Industrial Researchers

Instrument makers predict sales gains of at least 6 pct this year. This would top the record year of 1960.

Greater equipment needs for industrial research is one of the big reasons.

By K. W. Bennett

▪ Instrument makers are counting on at least a 6 pct sales gain in 1961. For most, this figure appears conservative. A number of companies expect to boost business by 25 pct. And 1960 was a record year.

E. J. Moscaret, midwest sales manager, Consolidated Electrodynamics Div., Bell & Howell Corp., indicates first quarter inquiries are well over the first quarter of last year and the company is budgeting for a record annual gain.

Says R. A. Piper, Midwest instrument sales manager for Beckman Instruments, Inc.: "The process control outlook is very good. In the second half of 1960 we exceeded our forecasts. Calendar 1960 was a record, and we'll beat that figure in 1961. Our forecasts are in the neighborhood of a 20-25 pct gain."

Steel Will Buy—Instrument specialist in steel industry sales for Hagan Chemicals and Controls, Inc., R. Blackwell, expects to boost sales to the steel industry by 20 pct in 1961.

E. F. Kowaleski, U. S. Gauge Div., American Machine & Foundry Co., is figuring on at least a 10 pct sales gain this year, with the chemical, petroleum, and food processing industries as strong market possibilities.

Sales manager Glen Brockett, Fisher Governor Co., notes, "There are more big instrumentation jobs up now than I've seen in the past two or three years. Nineteen sixty was our best year, but we'll exceed it in 1961. Second half prospects are particularly strong."

Who's Spending?—Where is all the money coming from?

Since Korea, it's been estimated by the Defense Dept. that its own procurement of instruments and controls has risen 15 to 25 pct per year. The 1960-1965 period is supposed to mark a slowdown, to an annual increase of only 8-10 pct per year.

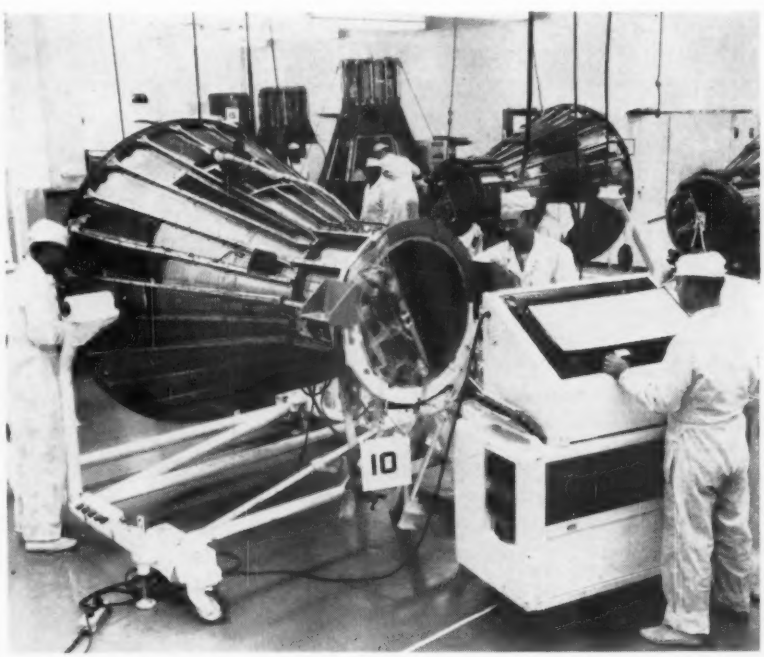
Part of the stronger outlook can be traced to more industrial use of instruments in new product and process research. One chemical producer estimates he doubles his plant instrumentation every 10 years. It's now figured that U. S. corporations boosted development outlays 10.7 pct in 1960, with a corresponding growth in their need for instruments and controls—both electronic and hydraulic.

More Computers—Thompson-Ramo-Wooldridge, Inc., says computer outlays alone will climb from the $3 million in 1959 to $10 million in 1960, and $30 million this year.

One computer setup even handles complete, automatic, quality control testing of electronic components in a manufacturing plant.

The conservative Electronic Industries Assn. expects that industrial sales of electronic controls and instruments will climb 9 pct in 1961 to a total of $1.75 billion.

A further breakdown: Industrial controls (electronic only) should go up 9 to 11 pct this year, computer sales up 20 pct, nuclear instruments and controls up 9 pct.



A MECHANICAL PATIENT: Instrumentation testing takes place in the "White Room" at McDonnell Aircraft Co. The parts being tested are in the assembly stage for the Project Mercury space capsule.

Will Warehouse Pickup Last?

Service Centers Encouraged by January Upturn

Steel distributors experienced an early January boost in orders.

But, despite this, some service centers plan to continue cutting inventories.

By K. W. Bennett

■ Steel service center sales are moving up.

This could be an important economic indicator as distributor sales show the willingness of the U.S. customer to get out and buy. Yearly they market about 15 to 20 pct of finished steel output to half a million metalworkers.

Better January?—Right now, the sales gain is measured in inches. A number of warehousemen believe they'll average 15 pct over December sales in January. This is no boom as December sales were conceded 1960's poorest. But in the first two weeks of January sales gains as high as 15 pct over the December period are reported.

Since December sales sagged sharply at mid-month, some warehousemen believe at the end of January some service centers will be 25 pct over December totals.

N. F. Korhummel, Korhummel Steel & Aluminum Co., Evanston, Ill., reports, "We already have a pickup. Opening January sales are running 10 pct, on a day-to-day basis, over the beginning of December. On that basis, we'll quite probably see a 20-to-25 pct monthly sales gain in January."

Ryerson Agrees—At Joseph T. Ryerson & Son, Inc., Chicago, President C. L. Hardy confirms the early January sales increase, at about the same figure. One center in the Southwest reports sales are not only over December, 1960, but are exceeding December, 1959, levels. On the West Coast, a marketer reports sales up 15 pct in terms of orders received, with at least a slight gain in the size of the average order booked.

Stronger Than Mills — January gains hint the warehouse industry is shattering a pattern: That a mill advance precedes an advance in service center business levels by three months. Since September, steel service center sales have moved with changes in direction of mill sales. Steel mills predicting a 10 pct business gain in January may find their distributor-customers actually moving up at a faster rate.

Service centers, according to the Steel Service Center Institute, have about 3.1 million tons of steel of all types on hand. Other sources estimate about 90,000 tons of stainless is included in that figure. In addition, they carry a major part of 210,000 tons of distributor inventories of aluminum. A "normal" warehouse inventory runs to 3.5 million tons of steel.

But Stock Cuts Continue—Despite the mild sales improvement, and the fact that warehouse stocks are at least 10 pct under a "normal working inventory," a number of important distributors say they will continue slight inventory reductions, often as long as through March. First quarter mill buying won't quite reflect the distributors' business gains. If mill lead times lengthen in February, however, the service centers will begin to rebuild inventory immediately.

Behind the cutbacks lies something deeper than inventory readjustment. An Eastern warehouseman comments, "I don't see a trend to permanently lower inventories. We have a sliding inventory level based on sales over the past 90 to 120 days—and that still leaves us adjusting inventory 3 to 6 months behind the market. But when

Distributors Are Optimistic

Midwest—"Our sales are up about 10 pct, and by the end of the month we'll probably beat December by 20-25 pct."

East Central—"On a day-to-day basis, we're beating the opening weeks of December by about 15 pct. We're still not betting this will be a winner, though."

East Coast—"We've been getting an order increase. I can't say that it would run to much over 5 pct, but I'm trying to give you a conservative estimate."

Midwest—"I think a gain, thus far, of 10 pct on a day-to-day basis is a little over-optimistic. We're only up about 1 pct, but I expect by the end of the month we'll be up 5 pct or better."

West Coast—"One of our branches is actually up about 20 pct over the first part of December. We figure we'll show sharp gains this month and drop off in late February because of the March 1st property tax out here. But we expect to come back in March, probably by 25 pct over December."

Southwest—"We've had substantial gains these past couple of weeks. We're not only running ahead of December, we're over December a year ago. The number of orders is coming up, and so is poundage per order."

business gets better, distributors will overbuy again."

Reduce or Not?—At least two important distributors are studying inventories for permanent cuts to lower levels, and are talking of cuts of as much as 20 pct in carbon steel products. Another points out that reduced stocks are dangerous when business gets tight, but has a top-level committee studying its inventory needs and may cut them 5 pct.

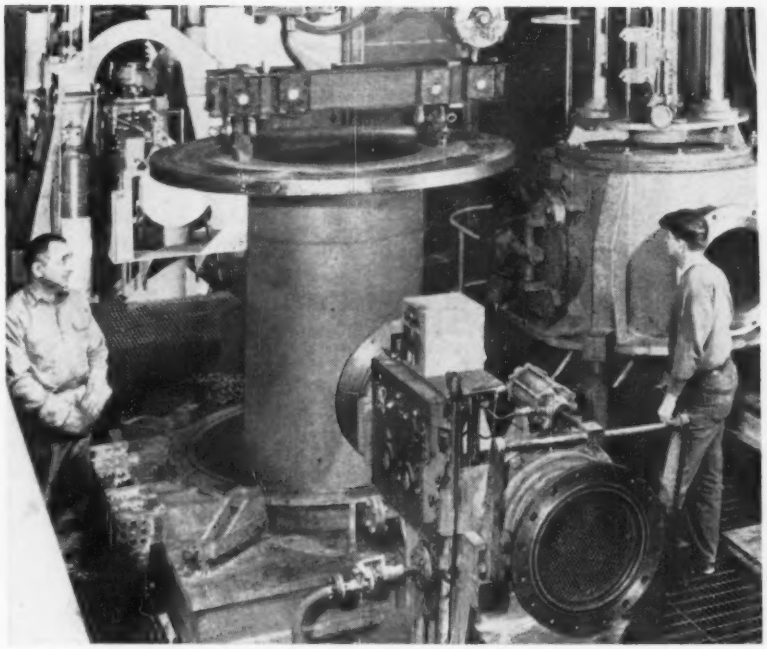
The general theory of the low-inventory group: A service center doesn't want to sell less steel. It wants to sell more steel. But at a fast enough pace to show a better profit margin than it did in 1960. Lower inventory and faster turnover mean higher profit and more cash to invest in fast moving items.

Small Scale War—The "lower-inventory, higher-profit" argument is assuming the aspect of a small scale, intra-industry war. Yet even warehousemen who say it's bad business to cut stocks further, admit they've permanently cut down on some bar stock, structurals, plate, wire, terneplate, strip, enameling and electrical sheet.

On the low inventory side, Rolled Steel Corp.'s Seymour Waldron comments, "We specialize in galvanized and lower stocks of other items. You could say we concentrate in galvanized, stainless sheet, and aluminum. We're not a grocery store. We don't have enough funds for that kind of inventory. We must concentrate on fast moving items. Smaller warehouses, especially, must not try to carry everything."

The Other View—M. R. Lowensteine, Central Steel & Wire Co., offers the counter argument. "I agree that it's often desirable to reduce model inventories for turnover. But we're dedicated to large and varied inventories. So we tend to de-emphasize turnover and concentrate on ability to meet any kind of order. We have enough space to be able to do this."

The Steel Service Center Institute reports that it will begin studies in the near future that will tie inventory more closely to the sales outlook.



WORLD'S LARGEST: A copper crucible is removed from what's said to be the world's largest consumable-electrode vacuum-melting furnace at the Watervliet Works of the Allegheny Ludlum Steel Corp.

New Vacuum-Melt Furnace Starts Up

■ The world's largest vacuum-melting furnace has been placed successfully in operation at the Watervliet Works of Allegheny Ludlum Steel Corp.

The new furnace is designed to produce ingots up to 50 in. diameter and weighing up to 60,000 lb. In its start-up phase, the furnace already has produced ingots of super-alloy steels of 40-in. in diameter. The company claims that these are the largest vacuum-melted steel ingots now commercially available.

Defense Markets — The market for most of the forgings and plates produced in the furnace will be in defense industries including aircraft, missiles and rockets. The company also looks for expanded use of vacuum-melted materials in civilian markets.

Built by the Lectromelt Div. of McGraw-Edison Co., the new 50 in. furnace brings to 11 the number of consumable-electrode vacuum-melting furnaces in commercial production at Allegheny Ludlum.

Method — The vacuum-melting process consists of casting cylindrical electrodes of a specified alloy composition from a conventional electric furnace. These electrodes are then remelted under vacuum by means of an electric arc and the metal is recast in a water-cooled copper crucible. The vacuum keeps contaminating elements out of the metal and draws off gases from the electrode as the molten metal falls into the copper crucible during the melting process.

Steel Research Keeps Customers

Modern Applications Lab Solves Design Problems

Customer design problems directly affect steel mills and can mean loss of contracts.

U. S. Steel Corp. is doing something about it with a new research arm, the applications research laboratory.

By G. J. McManus

■ It was bad news for the applications research group of United States Steel Corp.

U.S. Steel's research activity at Monroeville, Pa., learned a major railroad was going to aluminum for new racks to carry autos.

The St. Louis - San Francisco Railroad had rejected steel because rack weight would make flat cars topheavy and require extra ballast.

This brought quick action from the applications research men. The group came up with a design concept that employed high strength steel in place of carbon steel. The change means a superstructure light enough for solid balance.

This idea brings a reconsideration of metal specifications for the racks. Ultimately, the railroad switched back to steel for its design. It proved to be a big decision because the new method of moving autos caught on throughout the railroad industry.

Pointed Up Need—These events also prove how badly steel mills have needed a research arm tuned to customer's design problems. The mills have always offered metallurgical guidance. They have mounted effective market assistance programs and attempted product design in various informal ways.

But as a formal, full-time thing, applications research is relatively new in steel. First move by U.S. Steel in this direction came in 1958 with the appointment of an architectural specialist.

Since then, the corporation has created railroad, automotive, nuclear and structural sections. Under H. F. Shannon, chief of research engineers, applications research now employs 20 personnel and is growing fast.

Nearly all are specialists. Registered architects work on building problems. And nuclear and structural men joined U. S. Steel with experience in these fields.

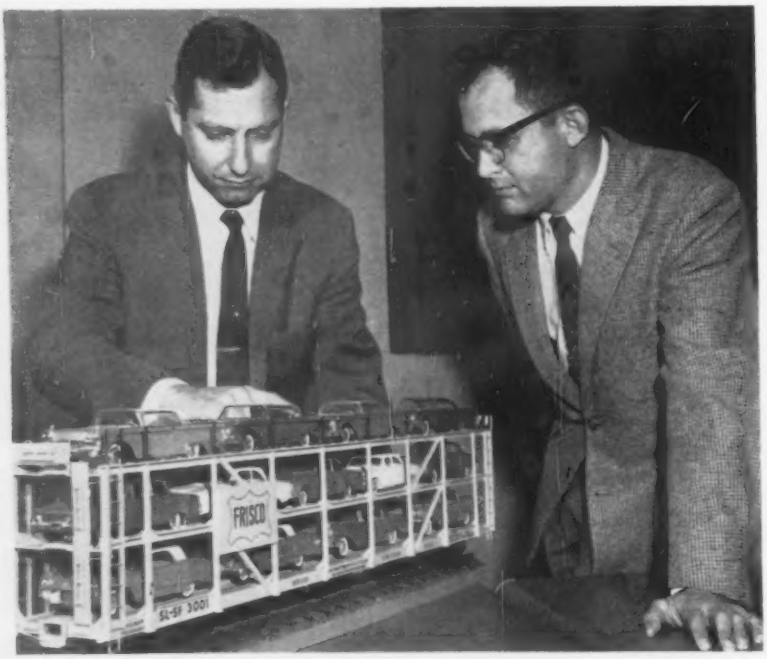
Varied Projects—In the automotive field, the group has worked on projects employing high strength steel for frames; galvanized for unit body sections; stainless cladding for bumpers. A new project uses nickel-free austenitic stainless for railroad hopper cars. In the building field, steel doorway assemblies and corner sections show promise.

At the moment, U. S. Steel applications men have their hands full putting out "brush fires". Ninety pct of their projects come in through the sales force. A large number involve situations where an existing use of steel is threatened by a competitive material.

Applications research enters these situations with two services. First, it seeks the best steel for a job. Then it works out design concepts that will make use of this steel's properties.

10,000 Varieties—Mr. Shannon points out there are some 10,000 different steels available. He estimates 20 pct of the grades account for 80 pct of the tonnage. Very often, he says, one of the more specialized grades could do a better job than the common type used.

In selling this message, it is not always enough to explain the quali-



IN TUNE WITH THE TIMES: Design changes on this tri-level automobile carrier were made at U.S. Steel's research lab. Instrumental in carrying out the operation were H. P. Clapp (left), research engineer, railroad applications, and C. G. Schilling, design engineer.

ties of a special steel. You can't just make a straight substitution, says Mr. Shannon. Designs must be modified to take advantage of added strength or corrosion resistance.

"Some designers are still specifying extra thickness as a corrosion factor."

He explains that a corrosion resistant steel may offer savings, but only if the product is slimmed down.

U. S. Steel's application research aims at providing some impetus for design change. Mr. Shannon says the effort goes beyond metallurgical counsel, but normally stops short of detailed design. Applications men think in terms of broad concepts and industry-wide use.

Defensive Thinking—The effort today is in part defensive. Present designs are modified and existing uses protected. However, the new steel door and the new corner section indicate applications research is starting to generate aggressive, original design thinking.

Mr. Shannon notes the whole program is "backed 110 pct." He hints that bigger things are coming. The new approach to design could affect the whole steelmaking operation.

Greater use of special steels will require more production flexibility by the mills. In this connection, he points to card and computer controls as one means of handling a diverse work load.

$20 Million Ore Work Started In Labrador

Over $20 million construction on the Wabush Lake iron ore project in Labrador will be started this year, according to Wabush Iron Co. and Pickands Mather & Co., Cleveland, managing agent.

At Pointe Noire, P. Q., a 25-mile railroad, costing over $15 million, will be started to link with the Quebec, North Shore and Labrador Railroad. At Wabush Lake, about $5 million of housing and other project construction employing 1200 men will be started.

Report Promotes Engineers' Role

In many industries there is a void in relations between management and its engineers and scientists.

This is happening at a time when tomorrow's products are in the labs and on the drawing boards.

■ Many of industry's future products are in today's laboratories or presently on the drawing boards.

Yet there is often a void in management's relations with its engineers and scientists. This is especially true of those employees in non-supervisory positions.

Lee E. Danielson, Bureau of Industrial Relations at the Univ. of Michigan, has compiled some extensive bureau research in this area into a report entitled "Characteristics of Engineers and Scientists." He outlines the problem and, as the result of interviews and discussions with both sides, probable solutions.

The Problem — Mr. Danielson points out that many engineers and scientists consider themselves in terms of treatment and compensation on a level with doctors, lawyers, dentists and accountants. Though there are definite distinctions which often make such comparisons illogical, there does exist a genuine feeling of being a "select group."

After interviews with technical supervisors and non-supervisors in a dozen industrial plants, he notes that 83 pct of the supervisors and 61 pct of the non-supervisors feel there is "a recognizable difference between themselves as a group and manual, clerical and technical groups."

Source of Conflict—One of the project's biggest findings is that delegation of responsibility is a potential source of conflict. Says Mr. Danielson: "Some supervisors feel the subordinates want too much responsibility too soon, and non-supervisors feel they are given too little too slowly.

This, of course, makes certain demands or strains on management. However, according to the report, "The desire for greater responsibility, as expressed by some engineers and scientists, can be capitalized on by management.

The Big Questions—Mr. Danielson asks management: "How well do you know your professionals? What has been your role in their success or failure? What are you willing to do to increase their contribution and satisfaction?"

The answer, he feels, is nine-fold. And it's a must if management is to really benefit from the training and talent of its personnel.

Emphasis by management for scientists and engineers must be in these areas: Selection, job activities, reporting, appraisal of performance, advancement opportunities, development of professionals, off-the-job adjustments, supervision, and colleges and students.

Solutions—Mr. Danielson points out that selection of personnel and the matter of reporting are key problem areas.

His suggestion: Don't always try for top-of-the-class graduates. This often leads, he says, to a case of "too many chiefs and not enough Indians."

On the matter of reports, the study notes that management would make a wise investment in hiring enough competent "secondary support" to handle the final preparation of reports.

How Serious Is Rift Between U. S. and Canada?

Most Canadians and U. S. residents share feelings of mutual respect.

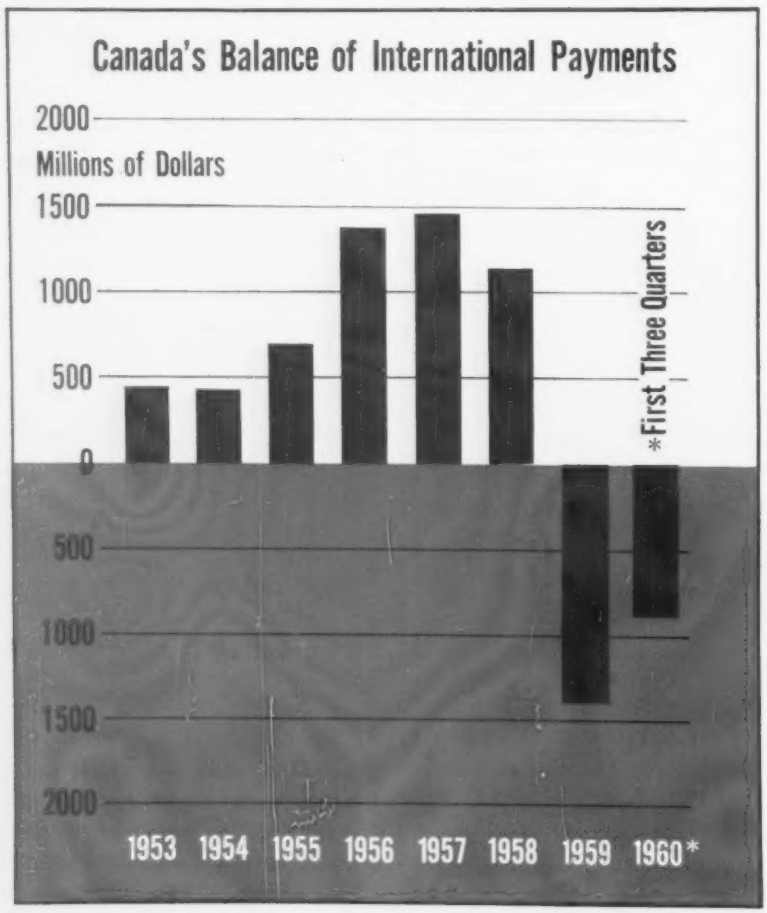
But there is a widening rift between the two countries. It's time to look at the issues.
By Tom Campbell

▪ Most Canadians like us, they like our country and they are not ready to close the borders. But that's not the whole story.

If you stopped here, you could say, "So, there isn't any trouble; what's all the shouting about?" It is a complex situation. There is trouble. Relations are not as good as they should be. It isn't all the American's fault nor is it the fault of the Canadians.

An Old Story—It's the old story of misunderstanding, lack of communications. It is the story of too much courtesy on both sides at top-level visits. It is the old story, too, of ivory towers — differences between diplomats and down-to-earth fellows. But it is important enough to take a hard close look at it.

How Trade Balance Shifted



For one big thing, Canadians are more than concerned about the reversal of their balance of payments from a big surplus to a deficit. (See chart) One reaction has been a revision of Canada's tax policies on U. S. businesses that operate there.

Very simply, the "withholding" tax on income remitted to the parent company has been raised from 5 pct to 15 pct. And for the Canadian branch operations, a new 15 pct tax has been imposed on earnings on top of the regular income tax.

A leading banker in Canada wants to bar all foreign investment from his country. He is opposed violently by many loyal Canadian businessmen. They are aghast at such a blast. And college officials, professors and students have gone so far as to ask that this leading bank official be removed as head of the Canadian bank.

Nothing New—Talk to government people and you will find quiet resentment at oil quotas, competition with U. S.-subsidized wheat in the world markets. Nothing has changed here from two years ago. The Canadian farmer still thinks he competes with the United States Treasury, not with the American farmer.

There is no subsidy in Canadian farming as there is in the U. S. When the Canadian farmer goes to the world market, he runs up against American give-aways. His hackles rise and he complains to his government. The same goes with oil where the U. S. has placed quotas on projects which we advised the Canadians carry out in the first place.

No Inferiority Complex—But all this reflects the facts of life. These differences are not enough to affect seriously relations between two

friends such as Canada and the United States. Nor is there any use of bringing in the psychiatric couch. The smart talk of Canada having an inferiority complex is laying it on a bit thick.

You don't have to have a complex to be irritated over being taken for granted, being taken as immature, or being treated as if the best technicians or the best engineers came only from the States. That would irritate the most cultured and mature person in the world. So it does irritate the Canadian professional and business people. Whether they are thin-skinned makes little difference. Interview after interview turned up this theme. A good cross-section of this thought runs like this:

"Why do American firms believe they have the best engineers, the best geologists and the best accountants? We have equally as good here in Canada. They are proficient. They are educated and they know what they are doing. This idea of bringing in a big task force to tell us what we ought to do when we have been doing it well long before the Americans came is indeed frustrating to say the least."

That from a leading geologist of Canada and a man who has a string of accomplishments a yard long. And he is a good friend of America, too.

Man on the Street—Talk to waiters, school kids, stenographers, professional people and secretaries, and you find no significant feeling one way or the other. They are too busy with their every day affairs. But if Canada had its brand of a Castro, the whole picture might change overnight. A few well placed incidents, a few person-to-person experiences described, plus some fancy propaganda and emotional clap-trap, and we would be in trouble. So would American business.

Nothing like that is likely to happen. But great friends of the U. S. in Canadian business plead for a better understanding of Canada's problems. They cite the high wages that Canada has; partly brought about by pressure from the arm of U. S.-dominated unions. This high wage despite the population of Canada, the extreme weather in many areas and a high cost of doing business.

Frustrated — Canadian business people who hope to advance feel hemmed in. They see Americans in top positions so they feel frustrated when they try to plan their future.

Listen to this fellow:

"If all supervisors and management above the foremen are Americans in a Canadian subsidiary of an American firm, what chance do I have? What is the probability of me getting ahead and reaching a better standard of living? None. And what happens when the American goes home? He is replaced by another American. That is unfair."

Another Voice—Is this fellow an exception? Not by a long sight. If this fails to point up the problem, listen to this official of a large Canadian subsidiary of an American firm:

"I am all for young fellows getting a break. I am for Canadians getting a break. I like Americans, too, and I do my best to get the best. But what happens? They come up here and their wives mark off the calendar every day; counting the days until their term is up. When the two or five year stint is done and I have a chance to recommend a better job or ask them to stay on, what happens? Many times the wife will threaten divorce. To keep peace the man will go back to the States. I get another fellow and go through the same thing. Not only that, when some Americans come up here they act just as they do in South America—they form American groups and do not care to fraternize with Canadians. Hard to believe? Yes, but it happens all the time."

Unless American businessmen—and government people—make a real hard effort to reduce the small irritations in U.S.-Canadian relationships, trouble is ahead. And according to many of those interviewed, can America afford to have lukewarm friends in times like these?

How One Canadian Sees It

"Seventy-five pct of the Canadian people have no animosity whatsoever toward their neighbors south of the border."

This statement came last week from William H. Durell, executive vice president of Hollinger Hanna, Ltd., agents for Iron Ore Co. of Canada. The latter company is owned by five American and two Canadian companies.

Mr. Durrell is president of the Canadian Institute of Mining and Metallurgy. He has been closely associated with the growth of his country's mining industry over the past 30 years.

In this interview, he minces no words in making known his opposition to hard and fast rules about what Americans should be allowed to do, or not allowed to do.

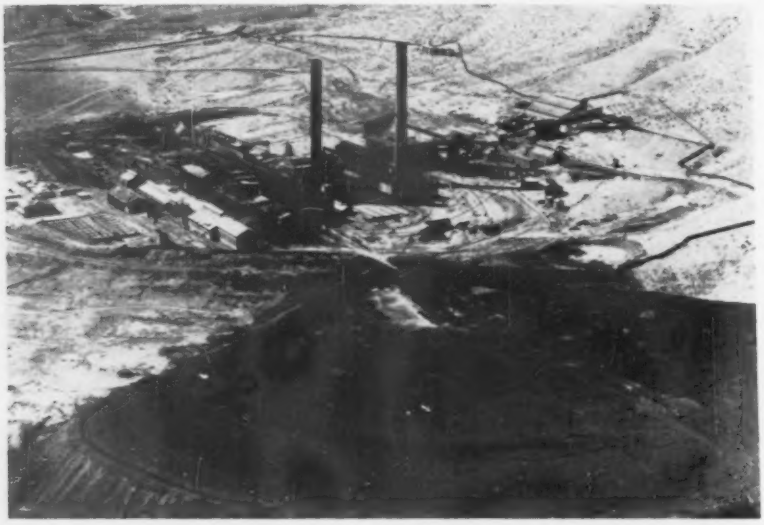
"I am utterly opposed to the viewpoint that foreign capital be eliminated from Canadian developments," he says. But he concedes that projects taking from $20 to $50 million could, and should, be financed by Canadian capital.

But he sees nothing wrong with encouraging investment by U. S. groups when $200 to $300 million is needed. "This helps develop our nation. They pay taxes and investment puts our people to work," he says.

What could U. S. companies operating in Canada do to alleviate tension? Mr. Durrell says:

They could use more Canadians in top positions; make stock available to Canadian employees. But they should not turn the flow of raw materials on and off because of temporary conditions.

Steel-From-Slag Changes Hands



STEEL FROM SLAG: A project to produce steel from waste copper smelter slag is now under full control of Gulf States Land & Industries, Inc.

Webb & Knapp, Inc., has transferred its interests in the project to its Gulf States subsidiary. The transfer will place the project, now in the planning stages, under separate management in a company distinct from Webb & Knapp's real estate enterprises.

The first steel mill planned by the new organization is to be built in 1961 at Anaconda, Montana. A contract to purchase slag from the Anaconda Co.'s 40-million ton pile there is transferred to Gulf States. This new process involves direct reduction of the slag with limestone and coal and the use of electric refining furnaces.

Under the re-orientation of Gulf States Land, the company will carry out a program of planning, financing and building the proposed steel mills and marketing their output. The original plan to produce only carbon steel ingots may be extended to include alloy steel ingots, and cement that would contain residues from the electric furnace refining process.

Corporations Initiate Education Gifts Plan

Higher education is due for a windfall under a plan worked out by Cleveland businessmen.

Twenty-one Cleveland corporations have pledged to give up to one pct of their gross incomes to colleges and universities. This results in $2 million per year already committed.

If the plan spreads nationally, more than $500 million could be raised annually. Originators are Charles M. White, recently retired Republic Steel Corp. board chairman, and George S. Dively, chairman and president of Harris Intertype Corp.

Current estimates place corporate giving to higher education at one-third of one pct.

National Supply Lets Pipe Mill Contracts

The National Supply Division of Armco Steel Corp. has awarded contracts for its new pipe mill at Ambridge, Pa. The contracts cover buildings and some equipment for the multi-million dollar combination mill.

O. H. Martin Co., Pittsburgh, will handle phase one of excavations and foundations.

Armco Drainage and Metal Products, Inc., Middletown, O., will fabricate and erect the buildings and crane runways.

Ingalls Steel Construction Co., Verona, Pa., will build an 80-foot extension and install roofing over the present runway.

E. G. Smith Co., Emsworth, Pa., will install the cranes.

The new mill is designed primarily to produce continuous weld steel pipe, at speeds up to 2000 fpm. It can also be used to stretch-reduce seamless pipe from the Ambridge plant.

The buildings will be 300 ft wide and more than a third of a mile long. Construction has started. Some operations are scheduled to begin in 1961 and completion of building is expected by July, 1962.

Attack Renewed On Pentagon Purchasing

The battle over Defense Dept. procurement has begun anew. Threats from the 86th Congress to change Pentagon purchasing methods are being heard early from the 87th Congress.

The Congressional gripe mainly is against the lack of competitive bidding in military procurement. A new Senate committee report charges that many negotiated and sole source contracts are unnecessary.

In fiscal 1960, the military departments advertised contracts with a value of $3.2 billion and negotiated $18.9 billion.

AF Selects Republic For Space Metal Job

A $176,000 contract to develop extrusion processes for titanium metal has been awarded to Republic Aviation Corp. by the Air Force.

The contract covers advanced phases of an intensive study into new techniques for handling the high-strength metals needed in advanced aircraft and space vehicles. Republic's work with titanium began over 10 years ago when it developed its own titanium drills and pioneered large-scale fabrication.

INDUSTRIAL BRIEFS

Slow Down Speeds Up—Datex Corp., Monrovia, Calif., has designed and built an electronic control system that accurately slows down a cold-strip mill. It increases mill efficiency by permitting greater speed for longer periods while processing a coil of steel. The system has been manufactured for use on various types of cold-strip mills including a Sendzimir and other finishing process lines.

Going to Goleta—Negotiations have been completed by the Western Design & Electronics Div. of U. S. Industries, Inc., to build an office and plant facility in the Goleta Valley outside Santa Barbara, Calif. The facility will cost about $1 million and is expected to be completed not later than May 15.

Pressing to India—The Siegler Corp.'s Hufford Division received a $100,000 Indian Government contract to build a stretch press to be used in the manufacture of aircraft sections. John G. Brooks, Siegler president, says the press will be delivered to Hindustan Aircraft Ltd. at Bangalore, India. It will be the second stretch press Hufford has delivered to Hindustan.

"Gun" Travels—The Wm. A. Holmin Corp. of Rockford, Illinois, is moving to a new plant location at 1325 Seventh Street, Rockford. The new quarters will represent an increase of more than 300 per cent in total plant area. The company manufactures the nationally known "Voice Gun" and other electronic communication equipment.

United Expands—United Engineering and Foundry Co., Pittsburgh, has purchased the Chrysler Youngstown plant at Hezlep Street, Youngstown, from the Chrysler Corporation, Detroit. United intends to move part of the weld shop operations now at the Phelps Street plant, Youngstown, to the new site and to expand facilities there.

Nevada Purchase — Columbia Iron Mining Co., a subsidiary of United States Steel, has purchased iron ore properties in Nevada. J. D. McCall, Columbia president, says deeds have been recorded at Fallon for the transfer of holdings of Mineral Materials Co. of Alhambra, Calif., and American Exploration and Mining Co. of San Francisco. The properties are located in the mineral basin area of Pershing and Churchill Counties, southeast of Lovelock.

Four Become One—Four companies have joined to form the new multi-million dollar United Systems Corp. The new company's president, Elmer P. Warnken, says USC will provide systems manager capabilities for missile and space programs, operating under a new management concept. The companies include Amcel Propulsion Inc., a subsidiary of Celanese Corp. of America; CTL Division of Studebaker-Packard Corp.; Technology Instrument Corp. of Acton; and Merz-Chambers.

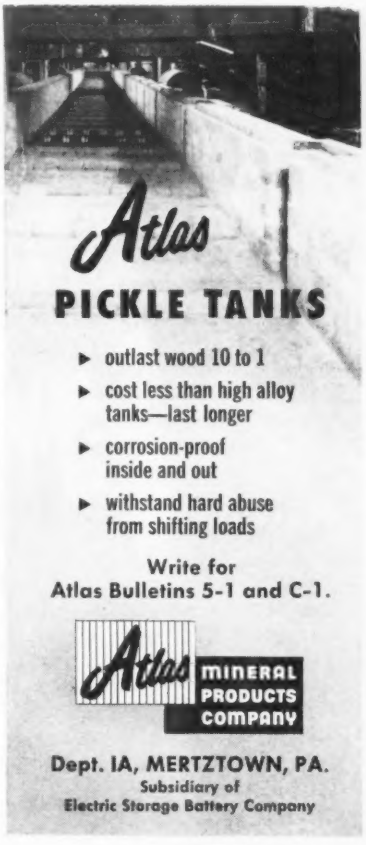
Tower Guidance—A structural erection service has been set up at Reynolds Metals Co.'s structural fabrication plant, Phoenix, Ariz. In production for less than two years, the plant has been producing aluminum transmission towers, switch yard structures and other heavy structural aluminum units.

Look to Lowell—Minneapolis-Honeywell's Electronic Data Processing Div., plans to build a new plant at Lowell, Mass. It will manufacture components for the Honeywell 800 and Honeywell 400 EDP systems. The new installation will produce packages of electronic components for incorporation into the Honeywell EDP systems assembled at the division's main manufacturing plant at Brighton, Mass.

Clearly Canadian—A new Canadian company has been formed, Wheelabrator Corp. of Canada, Ltd. The new corporation is the successor to the Canadian Div. of Wheelabrator Corp. of Mishawaka, Ind. It was organized to handle sales and fabricating activities for all provinces in Canada.

Scrap Elections—Milton K. Mahler, Morrow Steel Co., Detroit, has been re-elected president of the Institute of Scrap Iron & Steel, Inc. Re-elected first vice president at the annual meeting of the Institute was E. J. Moskowitz, Schiavone-Bonomo Corp., Jersey City. Renamed second vice president was Harry Marley, Abe Cooper-Syracuse Inc., Syracuse, N. Y. I. D. Shapiro, United Iron & Metal Co., Inc., Baltimore, is treasurer, and Leonard I. Abrams, The Atlas Steel & Supply Co., Cleveland, is secretary. William S. Story continues as assistant executive vice president, and William N. Brinker, director of public relations.

Industrial Firefighters—The 8th annual Industrial Fire Control Conference will be held at Purdue University April 4-6.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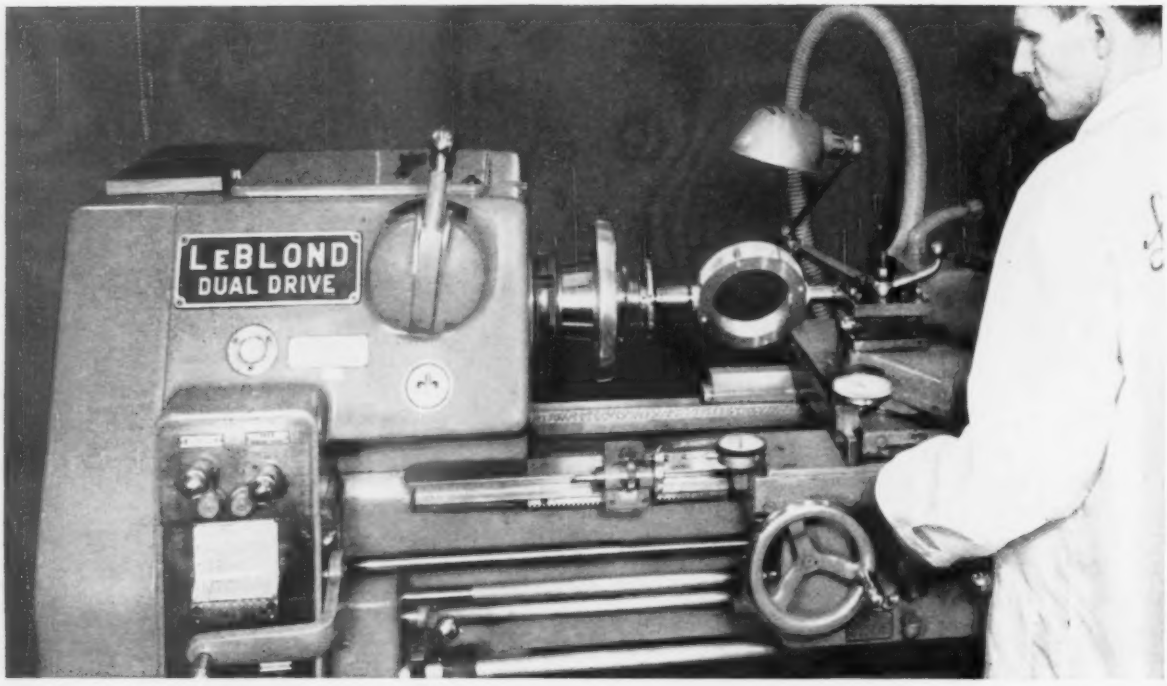
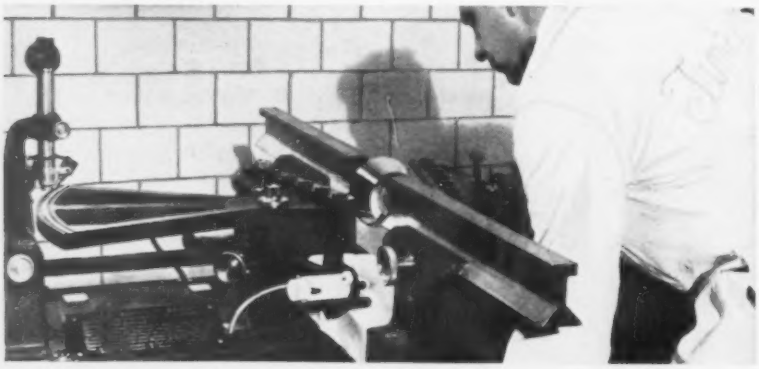


To give a customer a special, new high in precision in its 15″ Dual-Drive lathe was the problem for LeBlond engineers. The customer's product was a super-precise beryllium gyro float assembly. Diameter of the sphere: 1.8750″. Work specifications called for the sphericity to be held concentric with the two major axes within .0005″ total indicated runout.

To meet this, LeBlond specified Timken® super-precision "00" tapered roller bearings held to .000025″ assembled runout—one-third the normal runout tolerance. Timken bearings were also used on the intermediate, back and feed shafts of the drive. The assembled spindle runout (total indicator reading) was actually less than .000025″.

Producing super-precision bearings like this is typical of Timken Company service. The kind of service that developed Timken "00" bearings to meet industry's needs for ever-greater precision. It's another example of the Timken Company's leadership in tapered roller bearing design and manufacture.



ACCURACY IS ASSURED for Timken "00" and *all* Timken bearings by our modern gage laboratory, one of industry's finest. Some instruments we use are capable of comparing sizes to .0000005″. Such precision is another reason why American machine tool manufacturers prefer Timken tapered roller bearings.

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Marketers: Stay Alert, or Else

Marketing is not only more competitive, it's changing in scope and objectives.

Analyzing your own plans and programs now will pay off later on.

▪ If you haven't reviewed your marketing program, don't put it off any longer.

Few things will be more important to your company in the next few years than a sound approach to marketing.

Letup Unlikely—Greater emphasis on marketing began last year as sales fell off. But even when business improves, the pressure will continue. Keeping it on will be such factors as buyer price resistance, foreign competition, and technical advances.

But just competing strongly for existing markets won't be enough. Not only has the marketing tempo speeded up, it's also changing in scope—widening out, and getting more involved.

One marketer, H. F. Dunning, executive vice president-marketing, Scott Paper Co., sums it up this way: "We are in a new type of situation where everybody is looking at everybody else's business; where diversification is the constant desire on the part of many companies. It's a time when research and the physical sciences are forging ahead to the greatest degree we've ever known. And they are constantly coming up with new things which are changing the marketing equation for many companies."

The Wide View—Beyond these trends are others which are reshaping traditional ideas about marketing. Some imaginative companies are going beyond the concept of selling products. They are trying to become expert in selling whole systems (including a variety of diverse products). Besides products, they are marketing techniques, skills, and management know-how. Rather than stay within one industry, they are exploring others for their potential—five, ten, or twenty years from now.

In short, management's marketing objective is not selling what it makes, but making what it can sell.

Are Costs Decisive?—In such a climate, managers need both courage and imagination. Too close control on the pursestrings could be fatal. The costs of marketing can't be pegged to some established percentage of sales. This applies also to increasing salesmen's productivity.

Writing in the Harvard Business Review, George N. Kahn, president of George N. Kahn Co., and Professor Abraham Shuchman of Columbia Univ. point out: "Personel selling costs should be considered as a capital investment having the same characteristics as spending for product development. Executives must be ready to invest in the market in the same way as they invest in plant or equipment or research and development."

Personal selling, the most important promotional tool available for market development, is organized today almost exactly as it was in the day of the drummer, they point out.

"It continues to be organized around territories and products, rather than task."

Trends in Mergers Change

▪ Tighter competition may stimulate some corporate mergers. But, at least for the present, corporate raiding has died down.

That's the conviction of Lon D. Barton, president of Cadillac Associates, Inc., executive recruiters.

Benefits to All—Until recently, he points out, such raiders were on the watch for companies with weak earnings reports, small companies with spectacular profit gains, or family-held concerns where death leaves no line of executive succession.

"You still find an occasional raider on the loose," says Mr. Barton, "but most of them achieved the oblivon they deserved. What mergers occur now usually have sound beneficial results for both the merged and surviving company."

Companies in the $12 to $15 million sales area are finding it increasingly wise to pool their resources with other small to medium-sized firms, he points out. "This usually not only provides an increase in working capital, it also gives marketing people within the combined organization many more tools to work with."

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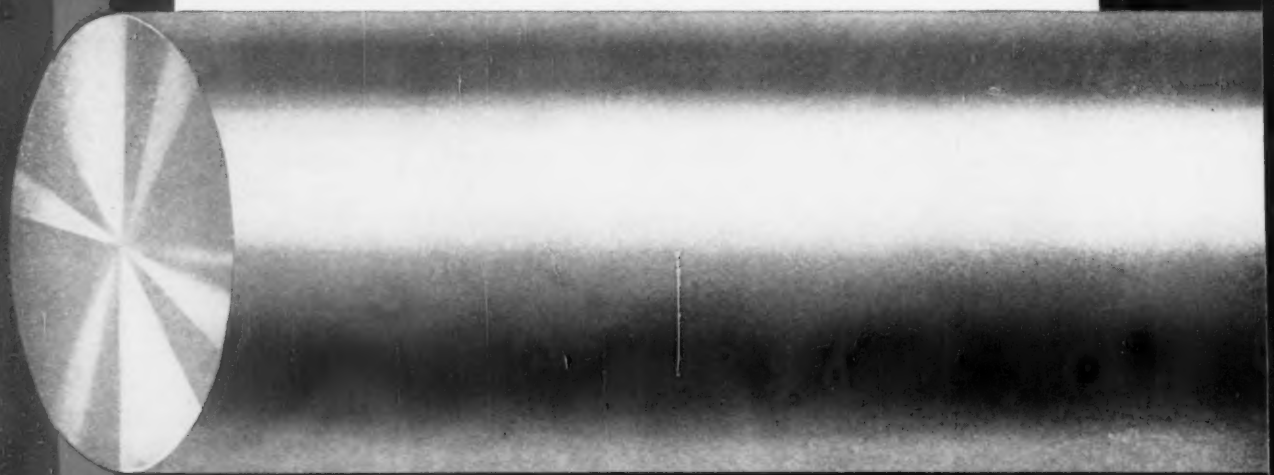

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A New Trend in Small Engines?

The small engine trend hasn't firmed up yet. Opinions on material and size still differ widely.

Aluminum is likely to stick in small cars, probably not in the full size jobs. New interest is indicated in 4-cylinder jobs.
By A. E. Fleming

■ What are chances for more 4-cylinder engines in American cars?

"There's plenty of public interest in them," claims J. P. Charles, Pontiac assistant chief engineer. "I think you'll see more nameplates offering fours."

Pontiac's Tempest is presently the only American car offering a four, a cast iron, 195-cu in. model. Although an aluminum V-8 is available at option, Mr. Charles says not many are being sold, "probably because of the higher cost."

Volume Low—However, problems with porosity when production first started at Flint (the V-8 is standard in the Buick Special and Oldsmobile F-85) has kept the aluminum engine's volume on the low side.

Buick's director of powerplant activity, J. D. Turlay, is not sure aluminum engines will go over in cars larger than compacts. (General Motors Corp. recently ditched a tooling program for big aluminum engines.) Mr. Turlay speculates that perhaps compact car buyers are willing to take aluminum engines because their lightness helps gas economy. He believes the aluminum engine's big car future "depends on how the aluminum engine is received and how economical it is to make."

Look to the Four—As for 4-cylinder engines, however, there is no doubt that engineers are very interested in them. Chevrolet has one in hand which might go into a 98-in. wheelbase car in the 1962 model year. But Studebaker's on-again, off-again program now seems to be off again. Supposedly, Studebaker would have sliced its V-8 in half, the way Pontiac did to get its four, in order to economize on machining operations.

But interest in the four isn't limited to car makers. On the market this week goes International Harvester's 100-in. wheelbase Scout, a sort of all-purpose vehicle. Under the hood is a 4-cylinder, 90-hp engine—half a V-8 which uses many of IH's V-8 engine parts.

Look for New Horse Power Rush

Daytona's racing season is a few weeks away. This means a rash of power-option announcements by domestic car producers can be expected despite the Automobile Manufacturers Assn.'s racing ban.

Although it's not certain Buick's Special will hit the speed trail, there is now a power pack that will push the Special's V-8 hp to 185 from 155.

Truck Parts Exports Hampered by Tariffs

Producers of truck bodies and equipment say high tariffs are making it almost impossible to crack markets in Mexico, Canada, and some South American and European countries.

The problem was noted at a recent meeting of industry leaders with the Dept. of Commerce. This information, along with that supplied by other industries, will be used by U. S. negotiators in discussing mutual tariff concessions with other countries at the Geneva meetings under the General Agreement on Tariffs and Trade (GATT).

A spokesman for the truck equipment industry also pointed out that the Union of South Africa has high import duties on hydraulic hoists.

Plastics Gain Auto Markets

Moving more strongly into plastics is an aim of the Dow Chemical Co. Main automotive target: Instrument cluster assemblies. This is a volatile market. Competition is fervid, not only among magnesium, but zinc producers as well.

There are many cost relationships as far as plastics are concerned. Varieties range from 30¢ to 90¢ a lb. According to S. V. T. Marshall, Dow plastics engineer, the 80¢ to 90¢ plastics give good technical reliability, but no economy. The 50¢ to 60¢ plastics give some reliability and cost savings, but nothing significant in either case.

Mr. Marshall is hepped on Dow's Styron 440, one of the 30¢ varieties now used to make a Buick thermoplastic cluster retainer plate. This comprises four pieces—the back which holds the instruments, instrument retainer plate, dial face, and Bezel or outer housing. He claims savings on this unit can amount to up to 45¢ a car and is the reason Buick scrapped original tooling on the part and made a running change from zinc.

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A 3M Field Engineer suggested SCOTCH-WELD EC-1386. In production, bonding gears to shafts with this epoxy-type adhesive eliminated the distortion-causing heat problem, ended high rejects, made 100% inspection unnecessary. The void-filling properties of EC-1386 reduced tolerances required between shaft and gear. And best of all, savings of $56.37 per thousand assemblies resulted!

Chances are your company can save money, speed production, simplify putting new designs into production by taking advantage of SCOTCH-WELD Structural Adhesives or other adhesive products developed by dynamic 3M research. Ask the nearby 3M Field Engineer to show you how! Or write AC&S Division, 3M Co., Dept. SBQ-11, St. Paul 6, Minn.

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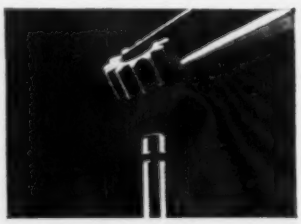

SCOTCH-WELD EC-1386 simplifies bonding gear to shaft by eliminating high brazing heat that distorted the tiny parts, changed metal hardness.

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How Will Kaiser Plan Fare?

The new Kaiser Steel-USWA bargaining plan is not likely to find industry-wide endorsement.

The idea of public representatives sitting in on early contract negotiations may not set well in some corners.
By R. R. Kay

■ How will the new Kaiser Steel-USWA bargaining plan fare in the realistic showdown of a contract fight?

The preliminary agreement was approved by the tri-partite group set up at the end of the strike last year. Kaiser split with the united front of the steel industry to sign its own contract. It included the group to study future bargaining, which has now come up with its program.

The principal, and most controversial provision, sets up public participation in the bargaining talks. It's not entirely opposite from the conclusions of the Livernash report on steel bargaining to the Secretary of Labor. (See IA, Jan. 19, p. 45.) But it is not likely to find industry-wide endorsement.

The plan: To have public representatives in on early contract negotiations. The idea is to have them in before bitterness has a chance to develop and crises arise.

There's Urgency—Both Edgar F. Kaiser, Kaiser Board Chairman, and David J. McDonald, USWA President, feel sure their boards will say yes to this new approach. There's some urgency. The current contract runs out June 30, 1961. Other steel contracts extend to 1962.

Here are the highlights of the Kaiser-USWA agreement up for OK:

(1) Labor and management would meet for collective bargaining at least 60 days before the contract expires. Thirty days before expiration, the labor-management Long-Range Committee would study the progress of the negotiations.

(2) The three public members of the Committee would be observers and, if needed, mediators.

Non-Fact Finding — Mr. Kaiser told The IRON AGE the technique is not fact finding. And the aim is to have public members present during negotiations—instead of calling for help when talks have broken down.

If this plan works out as hoped, the government may not have to get into the act.

Mr. Kaiser says: "This is not an agreement on the part of the union nor the company to accept the recommendations of the public members. This is merely a step to invite them to listen to the status of things 30 days before."

An Industry Plan?—Mr. McDonald, too, is optimistic. He said he will suggest this method to the rest of the steel industry.

Dr. George W. Taylor, Univ. of Pennsylvania, is chairman of the Long Range "Fruits of Progress" Committee set up by Kaiser and USWA. This nine-man, three-party committee was formed at the time of the 1959 Kaiser strike settlement.

LONG-RANGE THINKERS: Members of the "Fruits of Progress" Committee inspect Kaiser Steel Corp.'s Fontana, Calif., works. From left are: David L. Cole, a public member; Eugene E. Trefethen, Jr., vice chairman of Kaiser Steel; Dr. George W. Taylor, group chairman; David J. McDonald, president, USWA; and Edgar F. Kaiser, board chairman, Kaiser Steel. Committee includes public, union, and company members.

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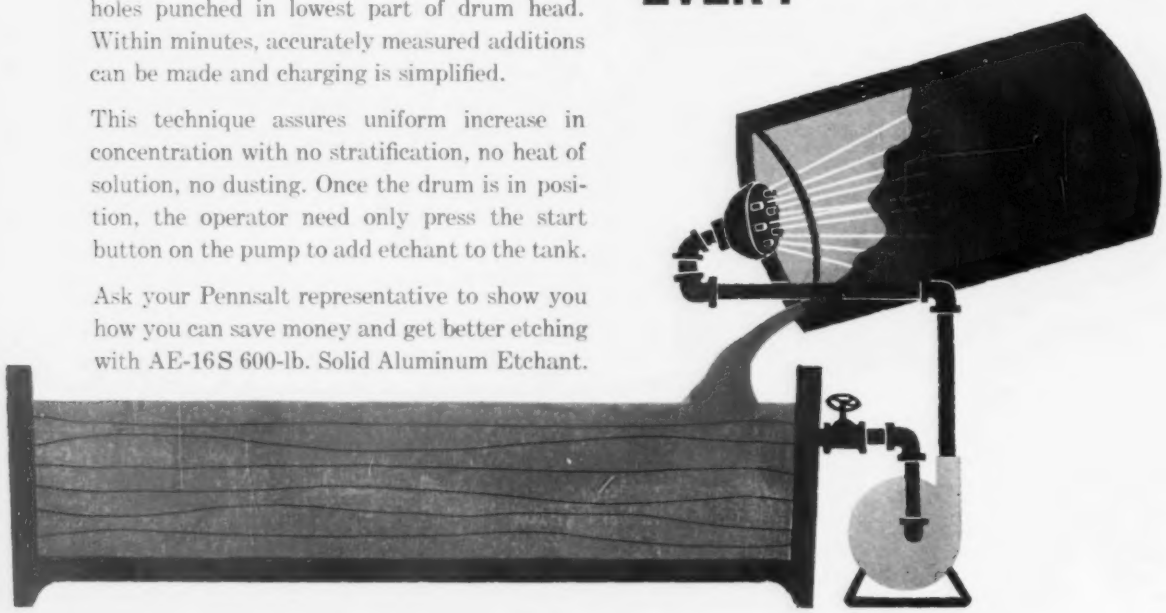

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Detroit Tool, Die Shops Unite

New Association Promotes Area as "Tool Capital"

To broaden potential markets, Detroit tool shops have banded together in a bootstrap operation.

Purpose of the Detroit Tooling Assn. is to tell the U. S. of the area's facilities and equipment.

By R. H. Eshelman

COMMITTEE ACTION: Members of the newly-formed Detroit Tooling Assn.* study the results of its first area machine tool survey.

■ When business sputters into one of its down cycles, some executives push the company panic button. But a group of Midwest tool shops —the Detroit Tooling Assn.—believe in more positive steps.

For some time now the Midwest area has been on dead center. Some business experts say it never fully recovered from the last recession. Foreign competition, high wages, taxes, union troubles, changes in the auto industry and the business climate are cited as causes.

However, to broaden their potential markets, some 160 tool shops in the area have put aside competitive differences and banded together in their own bootstrap operation.

Inform the Country—The object: To tell the country at large about facilities, equipment and technical knowledge available in the Detroit area.

Chester A. Cahn, managing director of the association, told The IRON AGE, "The auto industry has been responsible for the Detroit area becoming the greatest tooling center in the world, both from standpoint of personnel and equipment."

He adds, "Because of the seasonal nature of the industry's requirements, many of our members normally have periods of open capacity. By telling other industries and areas of the extensive facilities available here—and early deliveries possible—we expect to bring an increasingly large amount of tooling work into the area."

Already Active—The program has already made these moves:

1. It changed the name of the association from Automotive Tool & Die Manufacturers Assn. to Detroit Tooling Assn.

2. It redesigned and expanded a monthly information bulletin which is now sent to tool buyers across the U. S. It details available services of the members and the current delivery times.

3. It has started an active promotion campaign focused on the fact that its membership comprises the largest tool, die and special machine shop in the world.

Beginning to Pay—Although it's too early to predict the program's success, there are signs that it's already beginning to pay off. Recently one member finished 362 stamping dies for English car and truck bodies. The company also turned out 5000 to 6000 stampings from each die before the tools were shipped overseas.

Survey Findings — An inventory survey made of the member shops reveals some unique capabilities. With results 73 pct complete, Robert Bratton, chairman of the action committee, reports this equipment is available: Some 549 boring machines, 144 duplicating machines, including 48 hydrotel types; 554 tryout presses. There are also many spotting presses available.

Mr. Bratton also notes that a surplus of labor in Detroit means there is a pool of highly-skilled machinists and tooling craftsmen.

From left to right: Ned Stirton, administrator; William Davis, Davis Tool & Engineering; Robert Bratton, Bratton Tool & Die; Wallace Bohn, United Tool & Die; Chester Cahn, managing director; and Frank Decker, Precision Boring Co.

Ernst cuts steel costs to customers up to 10% with three new Wean Coil Processing Lines

Jim Moon, sales engineer of McKay Machine (above left), represents Wean Equipment Corporation in the Buffalo area. During a recent call on Ernst Iron Works, Division of Ernst Steel Corporation, Jim talked with Carl Grosse, Plant Superintendent, about the three Wean coil processing lines recently installed by this major metals warehousing firm.

According to Mr. Grosse, the Wean slitting, shearing and coil banding lines have reduced Ernst's handling, labor and scrap costs up to 10%. In addition to providing lower costs to Ernst's customers, this modern coil processing system helps this firm give fast service while easing inventory and supply problems through the purchase of standard size coils.

Equipped with modern, automatic controls, the Wean coil processing lines are operated by only four men and can handle 20,000 lb. coils, up to 54" wide and from .015" to .135" thick.

The McKay Machine Company, sales representatives for Wean Equipment Corporation to the metalworking and warehousing industries, will be able to assist you with complete engineering and technical information in planning your slitting and shearing requirements. Why not contact a McKay sales engineer to see how Wean coil processing equipment can help lower your costs.

THE McKAY MACHINE COMPANY REPRESENTS WEAN EQUIPMENT CORPORATION IN SALES TO THE METAL FABRICATING AND WAREHOUSING INDUSTRIES

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W. D. Spaulding, named vice president, operations, Weirton Steel Co., Div. of National Steel Corp.

Sel-Rex Corp.—**Al Korbelak,** appointed vice president, and **Sid Mitwol,** as vice president, The Meaker Co., a subsidiary.

Consumer Products Div., Philco Corp.—**H. W. Schaefer,** appointed vice president and director, engineering.

Avco Corp., Lycoming Div.—**J. M. Ferris,** named vice president, sales; **C. H. Buddenbaum,** appointed vice president, manufacturing; **P. J. Goodwin,** named vice president and controller; and **C. H. Wiegman,** appointed vice president, engineering; **F. J. Bird,** named vice president and general manager.

Ormet Corp.—**G. E. Zinniger,** appointed executive vice president, and **J. J. Miller,** promoted to general manager, Reduction Div.

Screw & Bolt Corp. of America—**Louis Berkman,** elected as board chairman.

Kerotest Manufacturing Co.—**E. N. Wrenshall,** elected vice president.

Huck Manufacturing Co.—**J. E. Callahan,** appointed vice president, sales.

Minneapolis-Moline Co.—**R. A. Trumpis,** elected vice president, manufacturing.

Axle Div., Eaton Manufacturing Co.—**W. M. Kelly,** promoted to manager, government sales.

Allegheny Ludlum Steel Corp.—**F. K. Murdock,** appointed district sales manager, Chicago area.

The Youngstown Sheet & Tube Co.—**R. V. Cordingley,** promoted to general superintendent, Steel Plant, Rolling and Finishing, Indiana Harbor Works; **J. C. Cannon,** named asst. general superintendent, Strip, Sheet and Tin Div.; **H. C. Rodgers,** becomes superintendent, No. 1 Tin Mill; **N. W. Tucker,** as superintendent, No. 2 Tin Mill.

C. A. Evans, appointed general sales manager, The Beryllium Corp.

Acme Steel Products Div., Acme Steel Co.—**H. D. Connell,** appointed division sales manager.

Dage Div., Thompson Ramo Wooldridge Inc.—**K. F. Petersen,** named general sales manager.

Edgewater Steel Co.—**L. D. Dunlap,** appointed general superintendent, and **William Schano,** as purchasing agent.

Landis Machine Co.—**A. R. Margin,** appointed export sales manager.

The Yale & Towne Manufactur-

W. W. Brooks, becomes general manager, sales, Wheeling Steel Corp.

S. B. Burke, appointed vice president, sales, The Hanna Furnace Corp.

J. V. McGuire, appointed general manager, Pittsburgh Works, Allis-Chalmers Manufacturing Co.

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AGF's **AUTOMOTION** Furnaces operate **wholly automatically** and **continuously**, and are easily placed in any continuous or intermittent production line.

Send for catalogs and details of models to meet your specific needs

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ing Co.—**F. R. Demmerly,** appointed corporate controller.

Consolidated Electrodynamics Corp., Data Recorders Div.—**H. S. Black,** named general manager of the new division.

H. A. Craig, named asst. to the vice president in charge of sales-corporate trade relations, Republic Steel Corp.

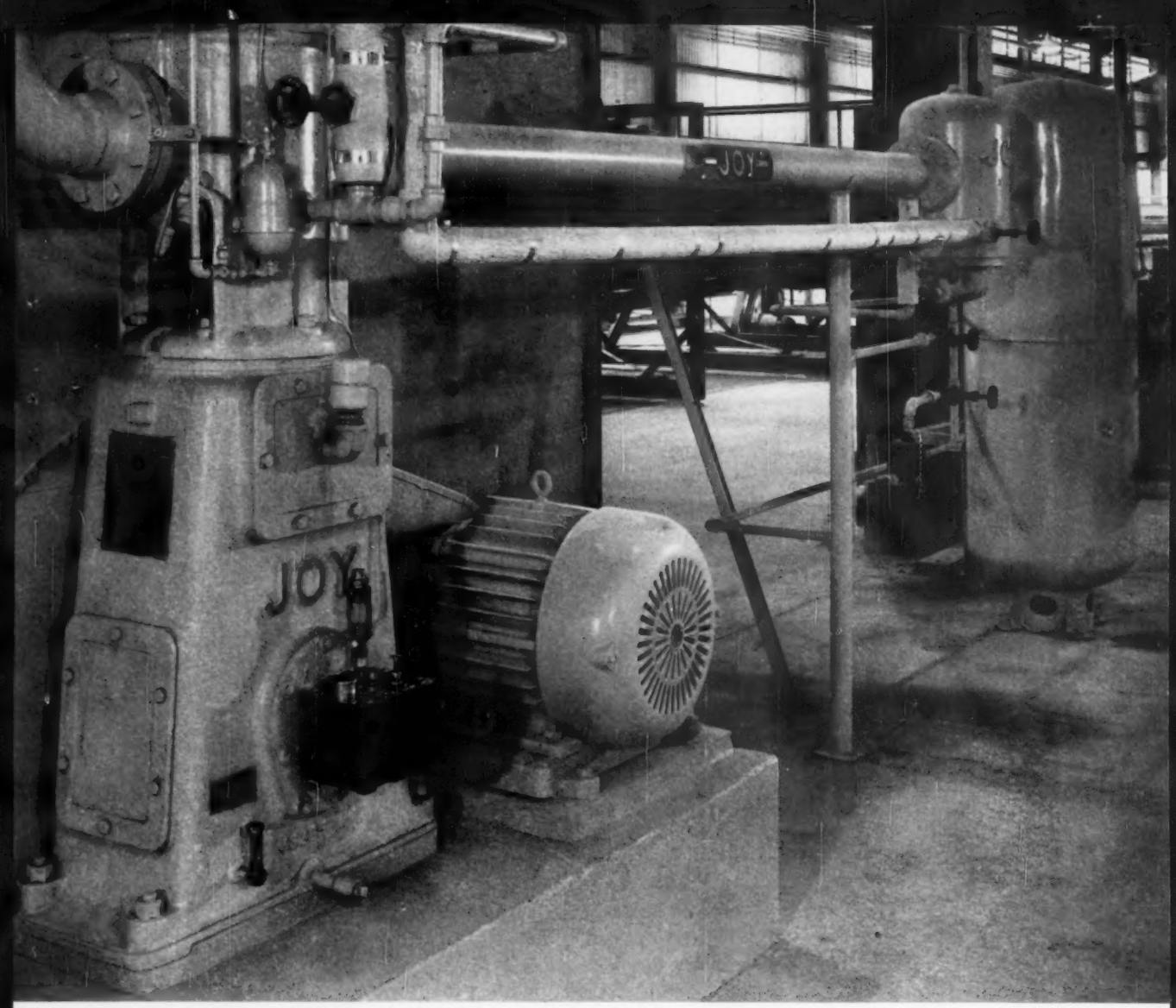
John Tope, named district sales manager, Birmingham, Ala., sales district, Republic Steel Corp.

The Colorado Fuel & Iron Corp., Pacific Coast Div.—**K. H. Brannan,** appointed purchasing agent.

Textile Machine Works—**L. T. Yeager,** promoted to general sales manager.

Erie Forge & Steel Corp.—**J. L. Rosenfeld,** appointed asst. to the president, budgets, cost control and corporate planning.

Bliss & Laughlin, Inc.—**E. R. Davis,** named general manager, Pacific Coast operations.



Century motor powers air compressor around the clock . . . .

This 25-horsepower Century motor helps furnish compressed air vital to the manufacture of gypsum-derivative products. With the plant operating three shifts daily, a constant supply of compressed air is needed to sustain the manufacturing process.

Century motors are especially suited for compressor applications because of their capacity to take frequent on-off cycling. Their high starting torque activates the tightly enclosed compressor pistons almost instantaneously. The Century totally-enclosed-fan-cooled enclosure offsets the presence of abrasive dust in the plant.

The Century Electric combination of a complete motor line (over 10,000 types, from one-twentieth to 400 horsepower) and a national sales organization whose exclusive interest is in motors, assures you of getting the right motors for your needs. If you have a motor question, contact your nearby Century sales engineer or your authorized Century motor distributor.

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Complete ductwork system of new Humble Oil Building is . . .

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When this handsome Humble Oil office building in Houston, Texas, is finished in 1962, it will be the tallest building west of the Mississippi River. All 44 floors will be served by galvanized steel ductwork. That's 700 tons of skin-tight zinc-coated steel—a combination of tough durability and excellent corrosion protection with the broadest economy east *or* west of the Mississippi River. Galvanized steel's economy starts with fabrication, continues with erection and installation and is perpetuated in what little maintenance is required after that.

WEIRKOTE® IN PARTICULAR!—That's the choice of Mr. Harold W. Looney, owner of Looney's of Texas, Inc., sheet metal contractor, for all 700 tons of ductwork in this new building. To the inherent strength of steel—to its economy, versatility and advantageously low expansion/contraction rate—Weirkote adds flawless fabrication and long-lasting corrosion protection. Chip-free, crack-free, peel-free Weirkote is manufactured by two National Steel divisions, Weirton Steel and Midwest Steel. Write Weirton Steel Company, Weirton, West Virginia, for further details.

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What Happens in Space?

Space hazards not to be overlooked are effects of ultrahigh vacuum and radiation upon spacecraft. Research must determine: Does alloy makeup change? What happens to properties? Which metals evaporate slowly? Can solid lubricants hold up? How long will thin-metal and paint coatings last. An NASA report suggests areas for study.

Could Alter Power Field

Reports at SAE Congress indicate major break-throughs in direct-energy conversion. Solar cells are used on satellites; low-energy fuel cells have been developed. Magnetohydronamics (MHD) has excellent potential as does direct use of nuclear fusion. Any of these could radically alter the power field in the next ten years —from autos and spacecraft to industrial electricity. Promising results are being achieved.

Rover Needs Huge Slabs

Destined for the Rover nuclear rocket program—a joint AEC-NASA effort—are four of the largest aluminum ingots ever poured. Weighing about 14,000 lb each, the huge, 14x4½x1¼ ft slabs are slated for fabrication into test reactor parts. The large aluminum ingots were 4000-7000 lb larger than standard rolling ingots.

Rocket Launch to Float

Drawings for a floating rocket-launch site are being completed by Aerojet-General. The site will be used for firing large, space-exploration rockets of the Nova class. The reason for floating the launch site is to solve the problem of radioactive wastes discharged by nuclear rockets that may be operable by latter part of this decade.

Ample Supply of Metals

No shortage in three key space-age metals is expected, indicates Mr. Marx Hirsch, president of Molybdenum Corp. of America. Recently, a Congressional committee reported that several metals, including molybdenum, columbium and some rare earths will be needed in much larger amounts in the period running to mid-1964. Molybdenum and columbium are gaining much interest for nuclear and space applications. Molybdenum may be used in the Dyna-Soar and space plane programs.

Titanium Gets More Study

Spending for titanium continues. A $176,000 contract for the development of extrusion processes for titanium has been awarded to Republic Aviation Corp. by the U.S.A.F. The contract covers advanced techniques for handling the high-strength, difficult-to-shape metals needed in advanced aircraft and space vehicles.

Ferrets Out Flaws

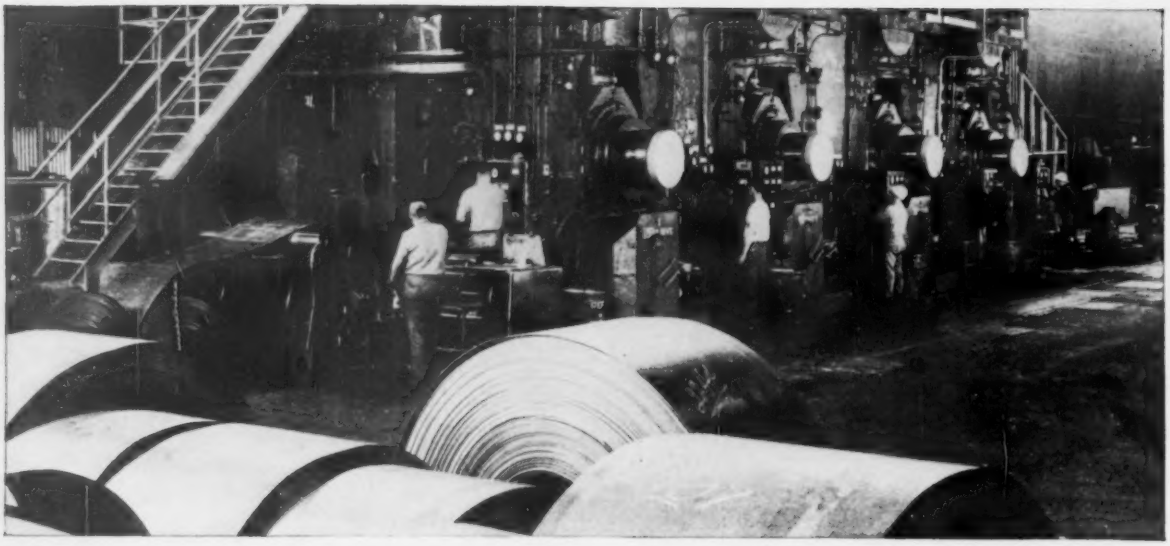
Speeding inspection of B-58 parts is an automatic, ultrasonic system. It consists of a 14,000 gal "pool", 32 ft long, 12 ft wide, 5½ ft deep, into which parts are immersed. Inspection is by a scanner which glides back and forth over the part at 36 ips. As B. J. Lefebvre, Convair engineer, points out, a "picture" of the part is made showing any defects. Recently, a part was checked in less than 3 minutes as compared to 1½ hr by another method.

More Money for Space

Former President Eisenhower's budget includes $965 million for civilian space projects and $584 million for military space projects. The money for NASA for fiscal year 1962 is an increase of $195 million over estimates for 1961. Military space money is a $73 million jump over 1961.

To Extend Communications

Congress is considering spending $50 million for communications satellites in fiscal year ending June 1962. The money is provided for in former President Eisenhower's budget. President Kennedy is expected to go along with this program. The money would go toward launching four satellites for worldwide telephone, telegraph and television services.



Four stand cold strip mill of Granite City Steel Company, Illinois. One of the most powerful tandem cold reduction mills in the U.S.

Heppenstall Sleeve #1727

was in the mill

89 times... and rolled

921,863 tons

At Granite City Steel Company . . .

Not every sleeve can roll a record . . . regardless of who makes it. But Heppenstall and Midvale-Heppenstall Sleeves have helped raise some *averages*, too, and that's what we'd like to do for *you*.

Heppenstall and Midvale-Heppenstall Back-Up Roll Sleeves reflect the long experience of two pioneer sleeve producers. Each sleeve's working surface is *tempered to meet your exact hardness specification.*

These mandrell-forged sleeves—made from highest quality alloy steel—are worked thoroughly under modern hydraulic presses to produce a finished product having both maximum density and grain refinement. They offer you exactness of fit and greater resistance to cracking and spalling during high-speed rolling.

Heppenstall and Midvale-Heppenstall also produce forged arbors . . . and have facilities to grind both arbors and sleeves for perfect shrink-fitting.

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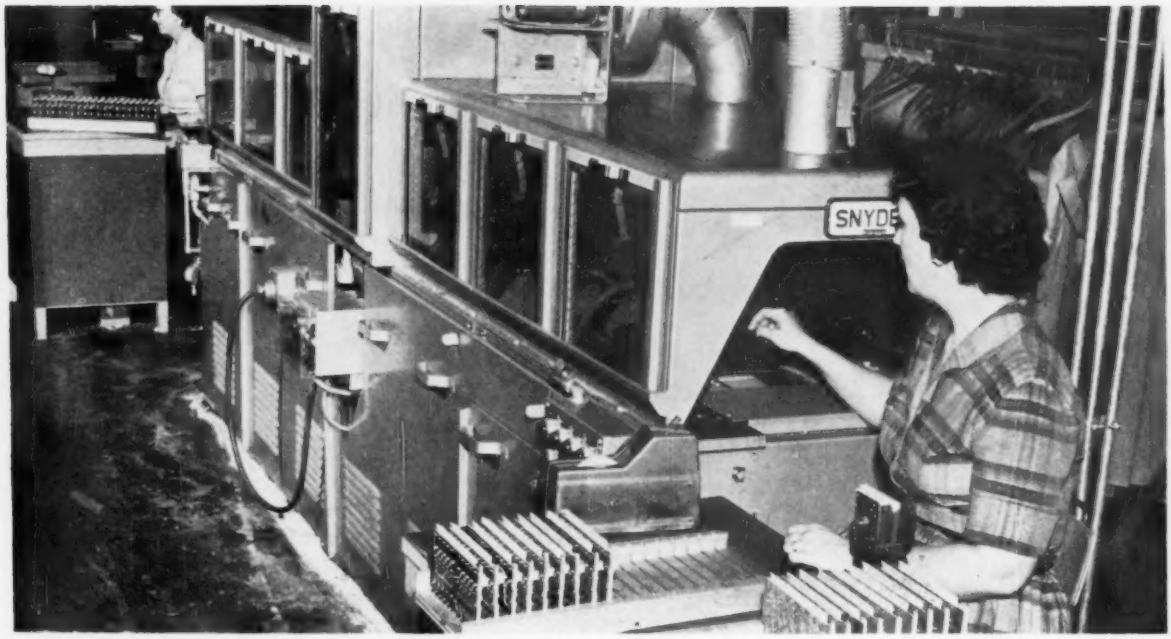


CLEAN HANDLING: Completely enclosed unit processes printed-circuit boards with electronic components.

Cold-Joint Problems Disappear On Automated Soldering Line

For a long time, soldering has stalled all attempts at automation. Conditions must be just right for success.

This metalworking prima donna now yields to a new production concept that routs the bugaboo of cold joints.

By **R. H. Eshelman,**
Machinery Editor

■ Soldering offers many automation incentives. Quite often, hand work leaves much to be desired. It's both tedious and tiring. It also requires a lot of manual dexterity.

The growth of electronics has questioned the validity of bench-work soldering, with its high cost. Trends toward printed circuitry pinpoint the need for mechanization. In future designs, the use of miniature and subminiature parts hinges on automation.

Initial Breakthrough — Leading the way to automated soldering is a new in-line unit, conceived and developed by the Burroughs Corp., Detroit. Designs for actual construction were handled jointly with engineers from the Snyder Corp., Detroit.

In full production for a number of months, the unit reveals some of the payoffs which result from automated soldering. One of the prime gains is a big drop in unit costs. However, there are other bonuses.

Controlled Quality—Plant manager, A. R. Perry states: "Not only does automatic soldering reduce product costs, it also yields more reliable parts. It virtually eliminates cold joints. Thus, it solves a major problem in the electronics industry."

Many gains are hard to assess in dollars and cents. Some, of course, can be pinned down. The cost of reworking poor joints normally creates a large, expensive bottleneck. Until now, this bottleneck appeared to be an inherent factor with any soldering process.

Even skilled workmen and careful shop controls leave a certain percentage of faulty connections. This causes troublesome headaches in the soldering of transistor leads or other small electronic parts on printed-circuit boards. Testing, trouble-shooting and rework costs

FREE SLIDE: Unit ejects completed, washed circuit boards onto a gravity-feed chute. Operator inspects parts and loads shipping pallets.

all skyrocket with each new shrinkage problem.

Production Payoff—On the shop floor, automatic processing pays off handsomely. The dip-soldering unit gives a continuous, completely-mechanized operation. Only loading and unloading work is done manually.

Production manager, Roy Tree reports: "This setup does in 17 seconds a job that used to take 21 minutes." Full cycle time is 34 seconds; but the unit ejects a completed board every 17 seconds.

The process eliminates hand or semi-manual fluxing along with the precleaning problems which occurred in previous efforts to automate soldering. Also, it's free of all bridging and dross troubles which tend to crop up in roll-soldering setups.

Ten Stations — Here's how the unit works. At the first station, an operator inserts a board and/or pallet onto a transfer carrier. This carrier, arranged on adjustable ways, indexes the board through the machine. Inside the second station, cellulose rollers apply a water-soluble flux to the underside of each board. This simple setup precludes gumming and contamination problems. To maintain cleanliness, the flux pan is removed and cleaned daily.

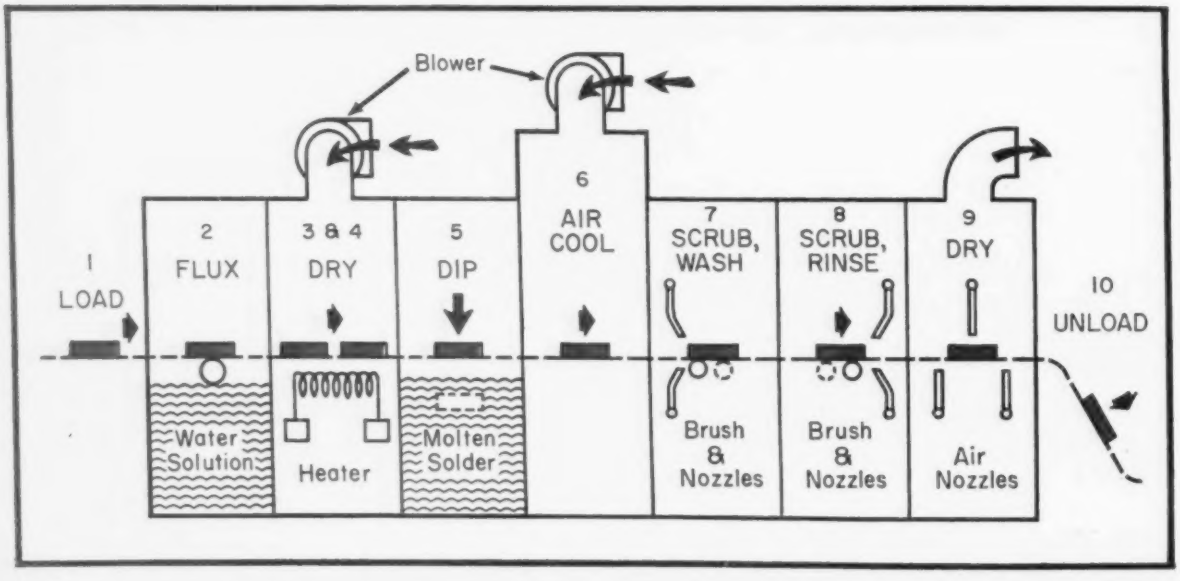
At combined stations three and four, heated air dries the boards. A high-pressure blower recirculates the warm air. Forced circulation speeds the drying of both the top and bottom of each board.

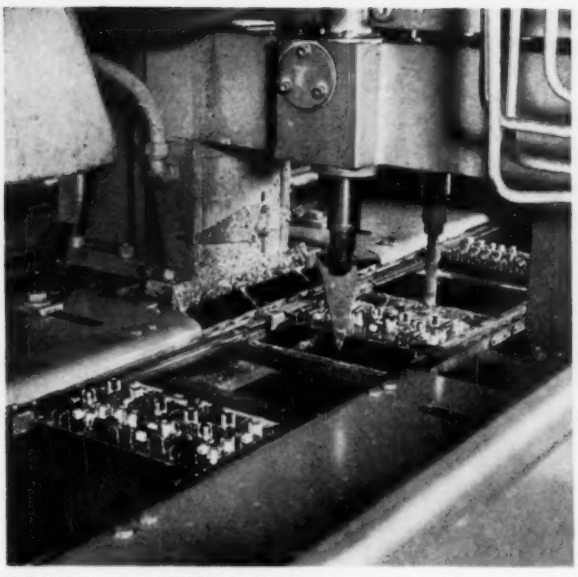
Dip Is Crucial — Dipping takes place at the fifth station. Every board is clamped to maintain flatness; then it's lowered into the molten solder. Depth of the dip is fixed. This helps to control the capillary action which fills the solder around each lead wire.

Dipping temperature is critical. It's held within a fixed soldering range, ±15°F. If the temperature falls below this limit, the solder starts to bridge and "icicle." This affects the capillary attraction.

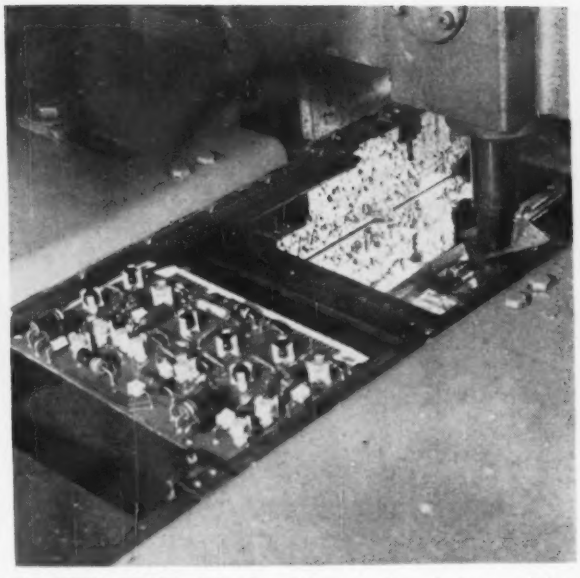
If the dip gets too hot, another problem arises. This problem centers on the danger of thermal shock which damages the boards and their components. Thermal shock

Unit Ejects Soldered Board in 17 Seconds





READY TO DUNK: Middle board is about to be dipped in molten solder. Depth of the dip is controlled.



IN THE SOUP: Dip head lowers board into solder. Capillary attraction of copper leads fills joints.

also impairs the capillary attraction.

Removes Dross — In the fifth station, all printed-circuit boards are cleaned by a wiper blade. Then, they're dipped in liquid solder for only a few seconds. Thus, electronic components aren't affected. But the time is sufficient to secure a solid bond of dross-free solder.

Following the dip is a cooling-off station. At this sixth station, another pressure blower, using ambient air, cools the boards to prevent heat from traveling up the lead wires to other components.

To complete the cleaning action, station seven has a scrubbing system. This station consists of pressurized nozzles for the top and bottom of the boards, plus a brush. The brush revolves at 1000 rpm. With a reciprocating action, the brush thoroughly cleans all residue that remains on the bottom of the boards.

Polished Circuits—Within station seven, there's a recirculating detergent solution. It's keep at a constant 140°F. In addition to cleaning, the brushing operation also polishes the circuitry to give an attractive appearance.

Next, in station eight, there's a rinse stage with another reciprocating brush. Clear, warm water is used. Flow off is discarded into a drain.

At the ninth station, air nozzles from a three-stage blower dry the boards. The air moves freely at 320 cfm with 32-oz static pressure. This takes off all residual water.

Station ten, the final one, is the unload chute. When the machine deposits a board on this inclined chute, it slides out of the processing line.

Self Cleaning—All carrier chains are made of stainless steel. And both carrier ways are adjustable to maintain central alignment. This reduces the chances of binding, chipping or slipping of the boards during transfer.

In addition, this design allows the carrier chains to be washed with the boards. Thus, the transfer chains are kept clean to prevent gumming from the flux.

Around the dipping station there's a thermal barrier. This barrier reduces heat loss from the solder pot. Thus, it helps to maintain an even temperature.

The pot is a standard unit which is interchangeable for easy maintenance and servicing. In less than an hour, it can be removed, replaced and the unit can be put back in operation.

Other Advantages — A vented bonnet prevents fumes from building up. To further reduce fire hazards, Burroughs uses a water-base flux.

Another nice feature that holds down maintenance costs is a central-lubrication system. Also, the machine uses stainless steel for all areas which contact the solder bath or the flux. Stainless maintains cleanliness and avoids contamination.

The entire unit is enclosed. However, sliding glass panels at the work stations provide visual inspection and access. To maintain positive location of the work in the solder, the dipping head locks at the proper depth, regardless of the solder level in the bath.

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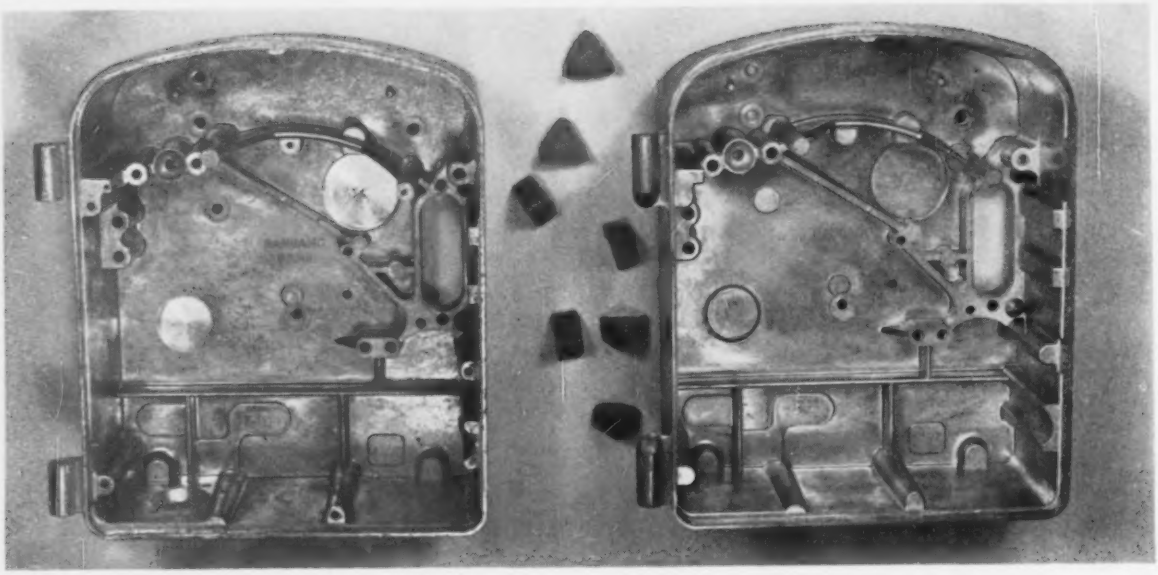


FLASH FREE: Aluminum diecast door (right) after vibrating for 3 minutes, using the pellets shown.

Vibratory Finishing Speeds Work On Metals and Plastics

By **F. D. Hodges**—Methods Engineer, Sangamo Electric Co., Springfield, Ill.

Parts of many shapes and materials clean up quickly with the scrubbing action of a vibrator.

Here are a few tips from a user that may solve your finishing problems.

▪ Since its birth, vibratory finishing has come a long way in the metalworking field. The process is based on the controlled vibration of a simple container, loaded with a media, and workpieces.

The vibratory action causes a rotary motion within the container that deburrs and scrubs workpieces. The key reason for the method's success is the short time cycles needed to obtain a desired surface finish.

Significant savings in time and money, in addition to other benefits, have been realized by many companies that use the vibratory system. Take, for example, the installation of Sangamo Electric Co., Springfield, Ill.

Nothing's Impossible—The company put in two separate vibrators, one heavy and one light unit. They were installed mainly for deburring a variety of parts that are processed in the plant.

The vibrators not only deburr these parts in one-tenth to one-hundredth the time formerly needed in tumbling setups, but the units can process many parts not adaptable to tumbling.

Surfaces, both interior and exterior, are scoured smooth and clean. Often, the parts' appearance is improved to such an extent that it can be left uncoated.

Save Your Skin—A benefit over hand deburring, not figured on originally, is the elimination of dermatitis. This skin inflammation became a serious problem during breaking or deburring of plastic parts. The parts were blanked or cut from glass-filled sheet stock having a melamine binder.

In hand deburring of such parts, tiny slivers of glass enter the operator's skin, despite the use of gloves. Moreover, filtering inhalators had to be worn to avoid intake of glass particles.

In wet vibratory deburring, these troubles are nil. The operation is rapid and the cost is low. Also, many pieces are processed at one time in sizeable batches, making processing cost per piece very low.

Handles Many Parts—The vibra-

tors clean up many other materials at the plant. They include, parts of low-carbon steel and stainless steel, small steel castings, aluminum castings, wrought aluminum, copper and copper-base alloys.

All of these parts are handled in either of two units. One unit has a 30-hp vibrator with a 20-cu ft capacity, and the other has a 3-hp vibrator with a 1½-cu ft capacity. Both units have timers, set to stop runs of selected duration. As a result, one man can operate both machines.

The containers, on both units, are lined with synthetic rubber. The wear on the rubber is very slight. Pushbutton controls and knobs adjust the vibratory speed to suit the parts. The higher speeds cut faster, naturally, than lower speeds.

Use Proper Media—For all finishing work, the machines are charged with synthetic aluminum oxide chips or pellets. Also added, is water and a suitable compound, such as Lord Chemical Corp.'s HS-9 or Luster All.

The HS-9 compound improves cutting action, partly by preventing the chips from becoming glazed. Luster All, as its name would imply, increases the luster.

Chips are designated by number according to size, and are irregular in shape. Sangamo uses sizes numbered 2¼, 4, and 6. Also used are pellets of specified shapes, such as ⅜ x ⅞-in. triangles and ⅜ x ¾-in. cylinders.

The chip sizes must be small enough to reach all surfaces to be treated and yet not lodge in holes. Large sizes cut faster, for a given vibrator speed, than smaller sizes. The special shapes cost more than standard chips, but they meet many special conditions.

Compare Materials—In deburring, much depends upon the size of the burrs. Heavy burrs require longer time cycles in a given media. Excessively heavy burrs may be bent over and not removed, especially on hard or tough materials.

Softer grades of carbon steel can be finished more rapidly than stainless steel. Aluminum also processes rapidly. Wrought copper responds about the same as soft steel. Glass filled melamine parts have their sharp edges rounded in a matter of seconds, while the effect on other glass surfaces is slight.

Process Datum—When ready for work, the machines' tubs have a total charge (chips, water, compound and parts) reaching within 2 or 3 in. of the top.

A cover or screen, fastened to the top, will prevent small parts from being jarred out. This isn't usually necessary unless, in the case of the screen, it is applied to permit liquid dumping, while keeping chips and parts in the tub.

In some cases, water is added for a short cycle to insure good rinsing action. When the compound has been washed out, the tub can be tilted and dumped onto a screen having a mesh suited to separate chips from parts.

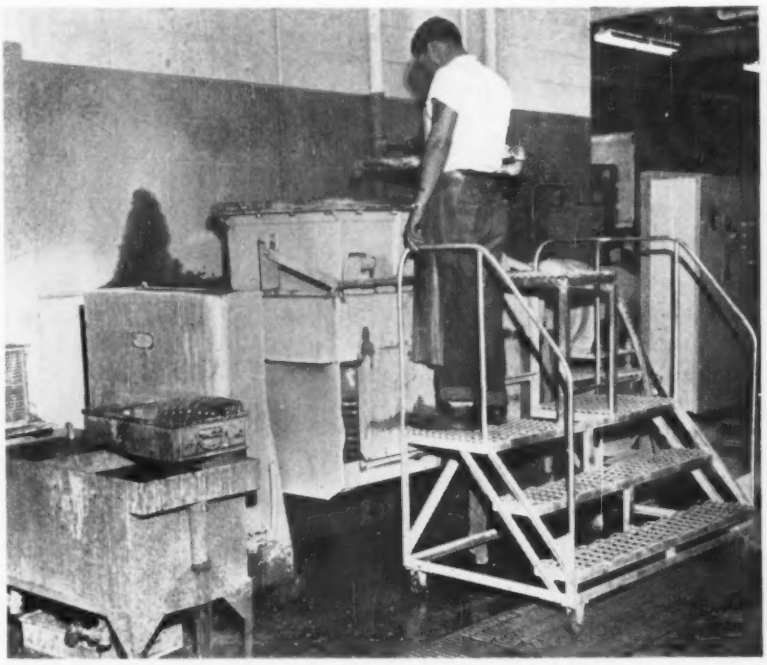
If Luster All is applied, usually after a cutting run, the cutting compound must first be rinsed out. The luster producing compound is then added along with water for another short cycle.

Often, a given media is used for several runs before recharging. This depends upon the total number of parts to be processed, the material, and upon the length of the run needed to produce desired results.

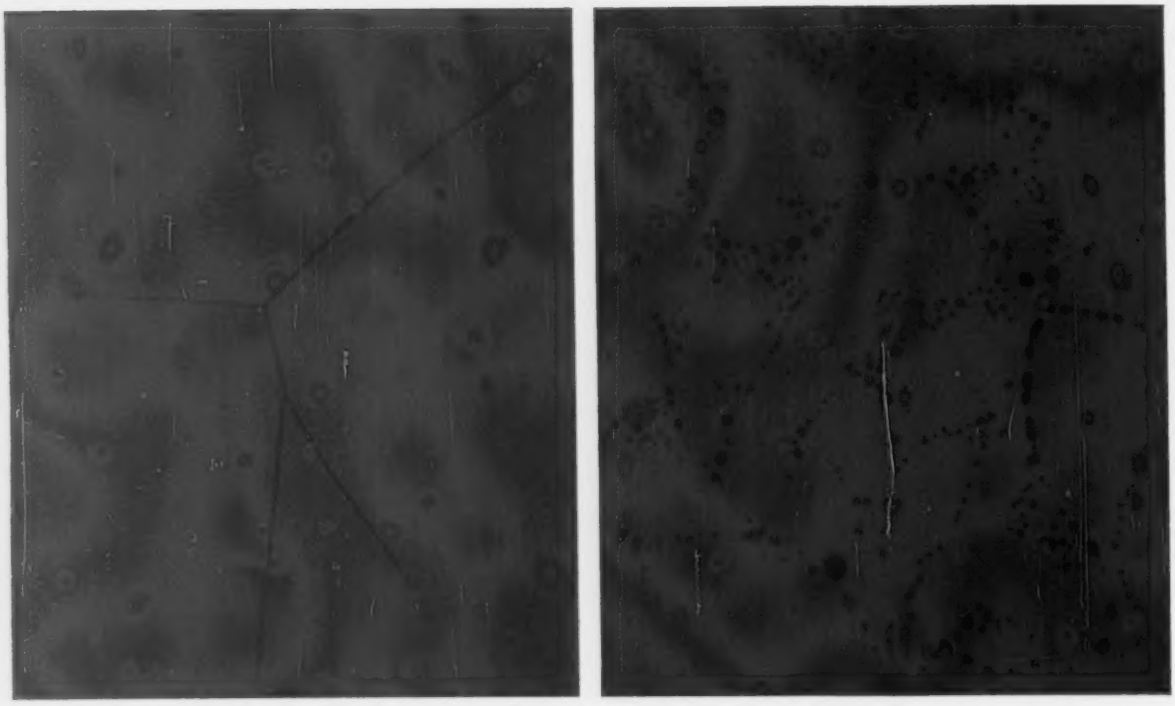
Other Methods — Although the advantages of the vibrators now have been well established, it does not follow that somewhat similar, if not identical results, cannot be attained by others means. Or perhaps, in some instances, faster and more cheaply.

Alternate processing may be entirely satisfactory for some classes of products. This applies, for example, to certain work done in a shot blasting machine used in the same plant.

In this machine, for example, many plastic moldings and aluminum diecastings are definned when flash is light. The surfaces of the diecastings have a "skin" of impurities removed, making the castings ready for anodizing.



BIG LOAD: Operator deburrs diecast aluminum doors in a large 30-hp vibrator. The surface finish is also improved in the 3-minute cycle. The unit's 20 cu ft capacity easily holds 20 door castings.



RESULTS IN SHORT CHIPS: Thin sulphide particles, dispersed throughout matrix of sulphur copper (right) help produce short chips that give new alloy its top machinability. Sample (left) is pure OFHC copper.

Sulphur Aids Copper Machining

By **E. E. Frisk,** Chief Staff Metallurgist, Bridgeport Brass Co., Bridgeport, Conn.

It takes just a pinch of sulphur alloyed with copper to boost machinability 450 pct.

Now commercially available, the new sulphur-copper alloy also has top electrical and thermal properties.

■ Sulphur copper is the latest member to the family of high-conductivity, free-machining alloys of copper. It's finding its way into a variety of parts. Examples range from nozzles and welding tips to motor and other electrical parts.

Behind this rapidly growing popularity is a unique team of properties. Electrical and thermal conductivities are high. Ductility and joining traits are good. Parts may be forged, rolled, extruded, machined, sheared, punched or coined.

What's Important?—The key feature is machinability. Sulphur-copper's rating of 90 means a 450 pct increase over high-purity copper.

For screw-machine shops which figure scrap value in pricing bids, sulphur copper has this added appeal. As scrap, it brings a much higher return than other free-machining copper alloys.

Making the new alloy calls for adding 0.3 pct of fine, high-purity sulphur to pure (OHFC) copper. It

Physicals: Keys to Alloy Performance

SULPHUR COPPER

Density	**0.323 lb/cu in.**
Thermal Conductivity	**216 Btu/sq ft/ft/hr/°F at 68°F**
Electrical Conductivity	**96 pct IACS**
Modulus of Elasticity	**17,000,000 psi**
Coeff. of Thermal Expansion	**9.8 x 10^{-6} per °F to 572°F**

ends up in the matrix as fine, uniformly-distributed, copper-sulphide particles. And, because the combined sulphur is inert, the alloy gives excellent corrosion resistance over a range of environments.

Gives High Rating — It's this same network of tiny, copper-sulphide particles that accounts for the high machinability rating. These particles help make short chips which break away quickly from the cutting surface.

Short chip time allows reduced clearance and rake angles. They, in turn, give greater cutting-edge support, higher cutting speeds with less fouling, and prolonged tool life.

Tests show that machining time for drilling deep and standard holes is greatly reduced with sulphur copper. These jobs have long posed production problems—especially on unalloyed copper parts.

Common hot working methods present no special problems when fabricating sulphur copper. There's no danger of cracking when forming in a recommended 1400°-1600°F range. The alloy also takes well to secondary hot forging of intricate shapes.

Will it Crack? — Sulphur copper has good ductility at high temperatures. Other point: It's not sensitive to hot shortness and cracking during silver-alloy brazing and soft soldering operations.

A high melting point lends itself to electrical applications. Where parts must be fired in a reducing atmosphere, sulphur copper's resistance to embrittlement is an added advantage.

Plating with silver or tin can be easily done. There's no need for a preliminary copper strike. Just use standard preparatory cleaning methods. The sulphur additive will not affect or discolor plated surfaces even after long standing periods.

Compare Several Alloys — How does the alloy hold up in the field? To compare relative production rates and machinability of several copper alloys, a number of tests were made.

Sulphur Copper Holds Its Own

	Chemical Composition, pct	Tensile Strength, 1000 psi	Yield Strength, 1000 psi (0.5 pct ext)	Elongation, pct in 2 in.	Hardness, RB	Relative Machinability, pct
Sulphur Copper	99.7 Cu; 0.3 S					
Half Hard (2)		42	39	20-35	40-45	90
Hard (3)		48	46	18-20	45-50	
Tellerium Copper	99.5 Cu; 0.5 Te					
Half Hard (2)		42	39	20-35	40-45	90
Hard (3)		48	46	18-20	45-50	
Leaded Copper	99.0 Cu; 1.0 Pb					
Half Hard (2)		42	39	20-35	40-45	80
Hard (3)		45	40	18-20	45-50	

1) Derived from data developed by Westinghouse Electric Corp. and Bridgeport Brass Co.
2) Half hard is standard temper for machining. Values given are typical for rod 1/8-2 in. OD.
3) Values given for hard temper are typical for rod 1/4-2 in. OD.

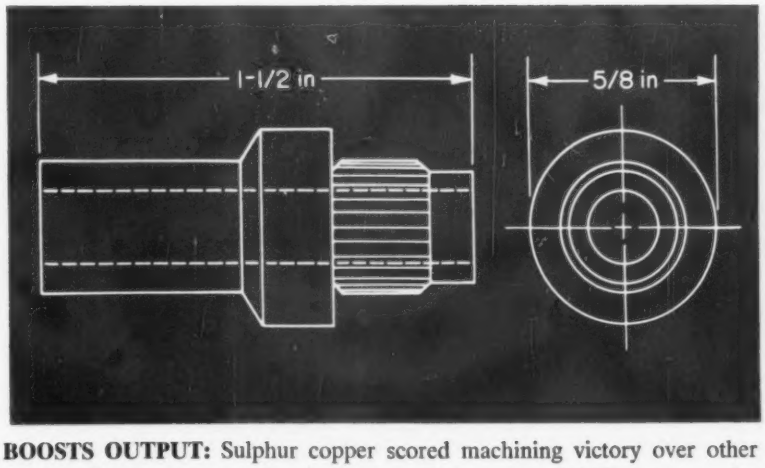
In one test, both sulphur copper and tough-pitch copper were used to make the typical automatic screw machine part shown in the drawing. Machining steps include: turn, center drill, chamfer, and knurl.

With sulphur copper, production rate was 140 pieces per hour. With tough pitch copper—only 40 pieces per hour. Tool life was four times greater with sulphur copper.

Takes Drilling Test — Another test compared concentricity traits of the new alloy with tellurium copper. Holes, 1/16 in. diam x ½ in. deep (8 drill diameters), were deep drilled in each material.

Inspection of randomly chosen parts shows no great difference in hole accuracy between these alloys. In the past, tellurium copper had been favored for its accuracy in this type of drilling.

New Alloy Wins Machining Test



BOOSTS OUTPUT: Sulphur copper scored machining victory over other copper alloy in test to make above part. Rate averaged 140 pieces per hr.

Film Processor Unravels Snag In Radiographic Testing

By **George O'Brien**—Chief Inspector, Alco Products, Inc., Dunkirk, N. Y.

All tests take time. Radiography is no exception. With radiography, film processing often creates a bottleneck.

By processing film in only 13 minutes, a new jam breaker speeds production testing.

■ Nuclear reactors, atomic submarines and guided missiles demand reliable components. There can't be any guesswork about the quality of these important parts.

These space-age parts comprise the major portion of the work at Alco's Thermal Products Div. To insure top quality, every inch of weld on each part must be inspected. Nondestructive tests pinpoint all defects. Radiography serves as the primary testing tool.

Necessary Bottleneck? — Many people consider radiography a bottleneck. To others, it's a blessing. Until recently, it fell into the former category at Alco's Dunkirk plant.

Tests take time. Radiography is no exception. No matter how much equipment is added to a radiographic lab, there's still a big bottleneck. This bottleneck centers on film processing. With hand processing, prior to reading, at least 90 minutes are lost waiting for each radiograph to dry.

Every weld at the Dunkirk plant undergoes 100 pct radiographic inspection. Thus, many films pile up on even the shortest work runs. Hand processing of these X-ray films creates production snags lasting from 8-24 hours.

Standard Procedure—Let's consider a case in point. A welder joins two sections of a 2½-in. thick steel pressurizer. He uses an encircling weld about 15 ft long. When he's done, the vessel moves on rollers to a shielded X-ray room.

In the X-ray room, the welded vessel is positioned under a 1000-kv X-ray machine. After filming the weld, a lab technician marks each film position on the pressure vessel. Yellow chalk simplifies coding.

Next, all films go to a darkroom for processing. Hand methods cause long delays in processing and drying films. During this lost-time period, the pressurizer is moved to a storage area. This is a must to make room for the jobs that follow.

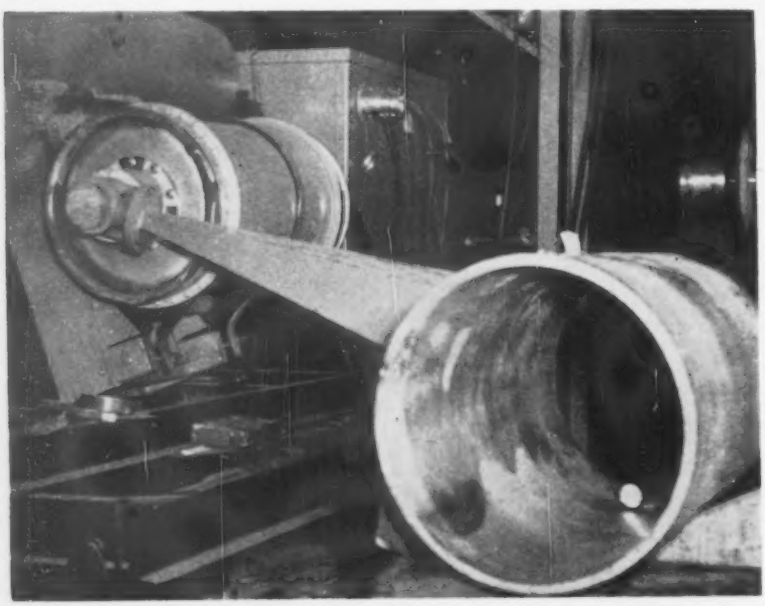
Interrupts Work Flow—When the films are finally read, sometimes 30-60 pct of the radiographs have to be retaken. This interrupts the production flow. The pressurizer in question has to be replaced on rollers and again wheeled into the X-ray room.

If weld repairs are needed, the entire cycle must be repeated a third time.

Recently, Alco replaced hand processing of X-ray films with an automated unit. Although this automatic film-processing setup has been in service less than a year, it has already paid for itself.

Quick Results—However, there's a bigger bonus. Now, radiographs are taken, processed and read so quickly that the full report on the welds is normally available before a part moves off the rollers. Film processing requires only 13 minutes.

The average time for a complete radiographic test report runs from



DOUBLE DUTY: Dual-head 300-kv X-ray machine is mounted on a dolly. Operator sets up the angle head; then he places film inside casting.

READY TO READ: Dry, processed films emerge from the film processor. Full cycle time equals 13 minutes.

HARD TO TEST: Complex welds secure heat exchanger for atomic sub. Each weld must be tested.

30-60 minutes. With the old method, each report took several hours.

There's nothing secret about how the changeover took place. It began with a decision to change from hand processing of films to automation. To start the ball rolling, an industrial X-ray processor was purchased from the Eastman Kodak Co., Rochester, N. Y.

The next step was to decide where to locate the new equipment. A central location had to be found. Why? Because the plant is spread out over several acres and consists of a number of buildings.

A building midway in the plant layout now houses the nondestructive test department. This X-ray inspection building is much more convenient than the old hand-processing darkroom.

No Lost Time—Introduction of Kodak's X-Omat Processor brought about many changes. All films are rushed to the X-ray inspection building. An inspector opens the cassettes in the darkroom and feeds the films into the processing machine.

In 13 minutes, the inspector removes dry radiographs from the machine's storage bin. He reads these films right away. Then he sends a report to the plate shop.

Most of the time, the inspector's report reaches the shop before the pressurizer leaves the X-ray exposure room. If the report indicates possible weld defects, retests take place with almost no lost time. Extra handling problems disappear because the part is still on the rollers.

Few Retests—Automatic processing reduces the need for most retests. Elimination of hand processing precludes water streaks, smears, scratches and dust spots on the radiographs. This also simplifies the inspector's work.

Most of the films used by Alco are 4½ x 5 in. wide. Special applications call for wider films. Some films, such as those which fit inside nuclear-reactor nozzles, are only 1½ in. wide by 6 ft long.

Kodak recommends the use of a leader in processing large films through the automated setup. Thus far, Alco's operators haven't bothered with leaders. Trouble-free, leader-less processing hinges on cleanliness. The entire processing machine is kept scrupulously clean.

Saves Film—Previously, about 40 pct of the films had to be retaken due to errors which cropped up in hand processing. With the new setup, the number of retakes is close to nil. Thus, quite a bit of film is saved.

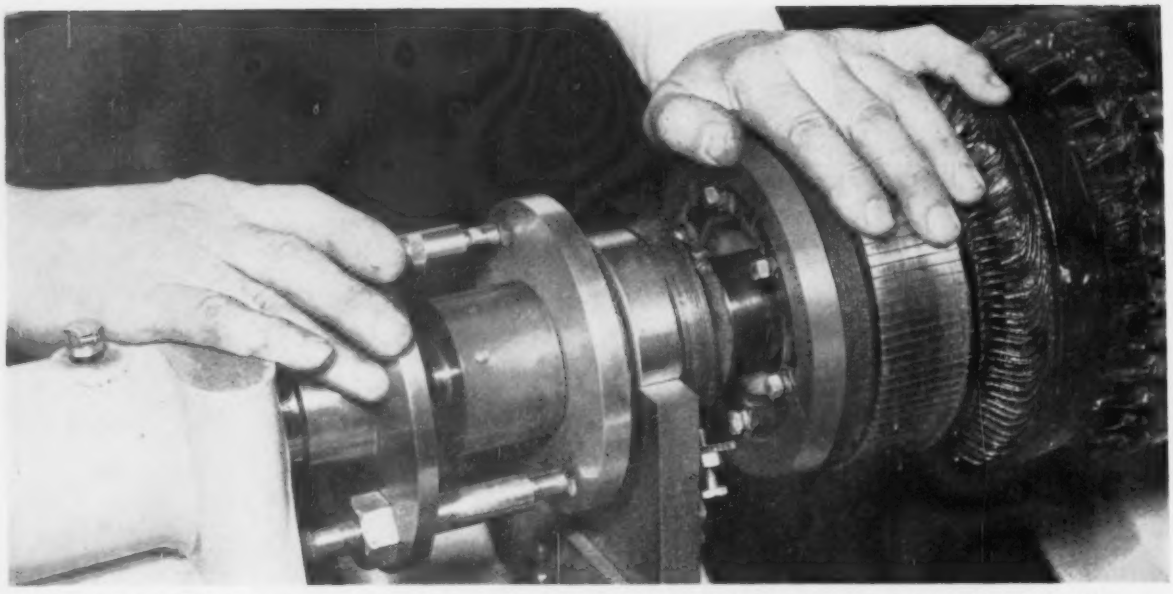
In a normal eight-hour day, 300-400 films run through the machine. The processor doesn't completely eliminate the need for retakes. On rare occasions, a film slips or moves during exposure.

Radiographic equipment at Alco-Dunkirk consists of five machines. A laboratory clean room houses a 175-kv X-ray unit. In the machine shop, there's a 250-kv unit.

A 1000-kv machine is suspended in a lead-lined room of its own. For complex angle work, a 300-kv unit features dual heads that swivel a full 360°. The fifth unit is a newly-acquired portable that's rated at 140 kv.

Whenever Cobalt 60 is used, X-ray work takes place in restricted outdoor areas.

Automated X-ray processing speeds the inspection of all welds. This, in turn, boosts overall production rates. Inspection costs have tumbled. Alco no longer considers radiography a bottleneck. It now serves as a vital production tool.



READY TO SPIN: Operator engages pins on the driving head with holes in the workpiece's drive adapter.

Design Rotors for Balancing To Extend Machinery Life

By **G. C. Lawrie**—Chief Engineer, Tinius Olsen Testing Machine Co., Willow Grove, Pa.

Almost all high-speed rotating parts require dynamic balancing and corrective action.

There are many ways to correct unbalance. In pre-production stages, designers should consider all alternatives.

■ Dynamic balancing plays a vital role in the production or repair of almost all rotating parts. For this reason, balancing during actual rotation should be considered a pre-production problem.

Unbalance in rotating assemblies reduces the life of industrial machinery. It sets up vibrations which cause abnormal wear in both rotors and bearings. Dynamic unbalance also creates fatigue stresses on surrounding parts.

The elimination of vibrations, caused by unbalance, smooths machining operations while cutting down noise. Other benefits include longer bearing and rotor life, decreased oil consumption and improved operator efficiency.

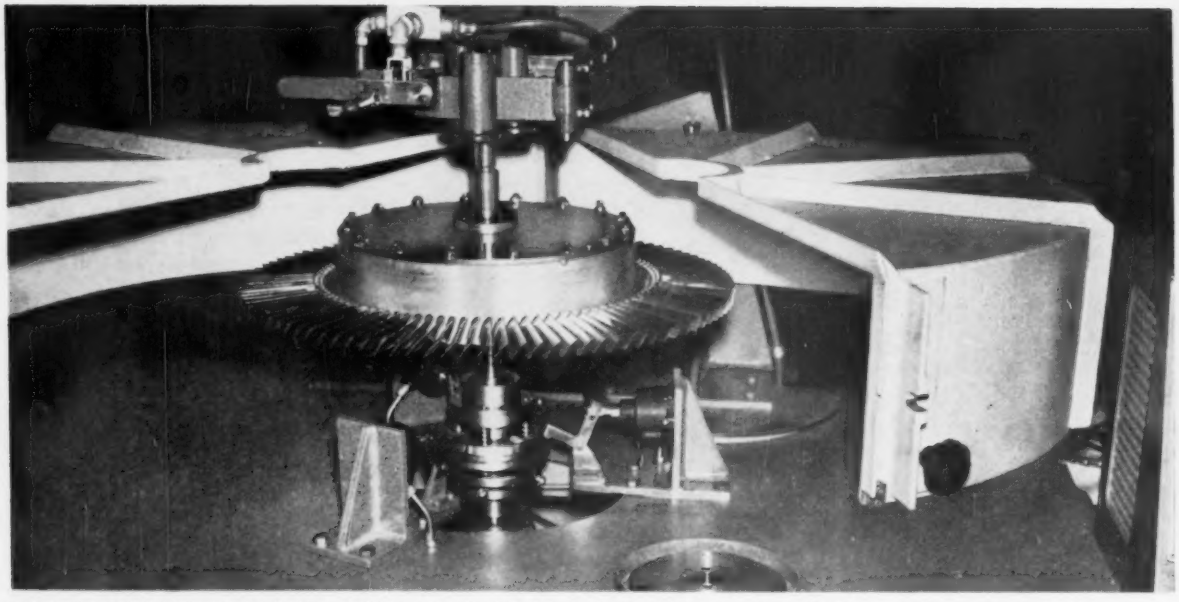
Extend Machine Life — Today, speeds up to 15,000 rpm are becoming more and more common. When rotor assemblies operate at these speeds, vibrations can't be tolerated. Shaking forces due to unbalance increase in direct proportion to the square of the speed. Thus, modern high-speed machinery hinges on close-tolerance balancing.

In some cases, unbalance can be corrected by proper design or by careful production controls. However, most rotating parts require dynamic balancing and corrective action to make the mass axis of a rotor coincide with the geometric axis.

If a rotating body consists of a complex assembly, or if it's made from castings or forgings, there's usually a lot of inherent unbalance in the assembled rotor. Castings may lack uniform density; but errors can also crop up in machining rotor parts.

Correct Unbalance — The fastest and most accurate method for making balance corrections centers on drilling to remove weight. The weight removed is controlled by regulating the depth or number of drilled holes.

Unbalance can also be corrected by grinding. In grinding out an unbalance, accuracy depends upon operator judgment. This is one of the



BLADE ANGLES CHANGE: At high speeds, blades deflect. This creates unbalance and severe stresses.

reasons why grinding isn't used in production balancing.

With rotors such as armatures or generators, it isn't practical to remove weight for balance corrections. And, in making these parts, nonsymmetry can't be avoided. Why? Because the laquer used to impregnate coil winding cannot be applied uniformly.

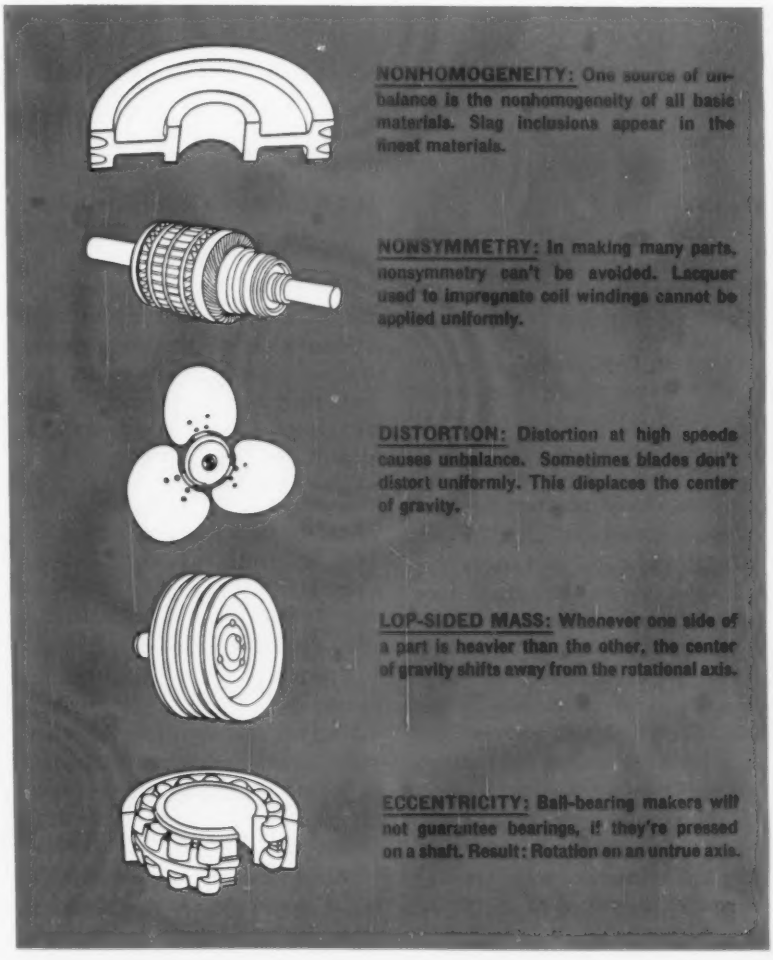
In these cases balance corrections must be effected by adding weight in some manner. Of course, in order to correct on a production basis, provisions should be made during design stages.

Attach Slugs—Metal slugs, graded in weight, may be the answer. After the angle and amount of unbalance is pinpointed, these slugs are spot welded in the proper locations.

Some armature makers use another correction method. They drive metal slugs of different lengths into the armature slots at each end of the laminations. These slot positions correspond to the two planes of correction.

Other rotors create even tougher balancing problems. A case in point is thin-gage separator bowls. These parts can't be drilled. And bulky slugs can't be attached to the bowls. But there is a simple solution to this

Trace Source of Unbalance


NONHOMOGENEITY: One source of unbalance is the nonhomogeneity of all basic materials. Slag inclusions appear in the finest materials.
NONSYMMETRY: In making many parts, nonsymmetry can't be avoided. Lacquer used to impregnate coil windings cannot be applied uniformly.
DISTORTION: Distortion at high speeds causes unbalance. Sometimes blades don't distort uniformly. This displaces the center of gravity.
LOP-SIDED MASS: Whenever one side of a part is heavier than the other, the center of gravity shifts away from the rotational axis.
ECCENTRICITY: Ball-bearing makers will not guarantee bearings, if they're pressed on a shaft. Result: Rotation on an untrue axis.

SIMPLE SETUP: Belt drive spins rotors on this Italian-made balancing machine. When desired, air may be used to control rotation speeds.

balance-correction problem.

A calibrated length of wire solder, flowed over a bowl's inner or outer surface, corrects the unbalance without altering the rotor's function.

Tolerance Is Key—In the design stage, any rotor should be carefully studied to find the optimum method for balance correction. Then, while the part is still on the drawing board, provisions should be made for balancing and correction.

One basic factor influences the choice of a correction method. This important factor is tolerance. Ideally, a series of tests should be carried out to check the effect of varying amounts of unbalance on the smoothness of running and on rotor life. Naturally, these tests prove costly and time consuming.

In practice, designers take advantage of known data to specify most tolerances. However, with new developments they often have little or no past experience to draw upon. When faced with an all-new balancing problem, the designer tends to specify too tight a tolerance.

By working to tight tolerances, the designer excludes the chance of unbalance in testing an unproven design. Thus, he eliminates one variable in an easy manner. But by doing this, he creates a costly bottleneck.

Consider Final Assembly — Too often, the tight tolerance proves difficult and costly to obtain. Tooling, assembly and coupling problems may render the specified tolerance unrealistic.

Therefore, in all cases, the designer must consider the balance-correction tolerance of the completed assembly. When it's difficult to balance a complete rotor assembly, due to size or shape, then all components are separately balanced.

Having determined the best method of correction, it then becomes necessary to select a balancing procedure. Several factors must be considered. Production needs play a paramount role in making this selection.

Rotor Drives—A simple, reliable drive for general-purpose balancing centers on a flexible drive shaft. This shaft maintains a positive end location on the rotor. The end connection can cause false readings if it isn't properly aligned.

Belt drives are also quite common. With belt drives no direct coupling is needed. This speeds insertion and removal of rotors. Of course, some form of end location is a must. One solution: Simple reference marks on the rotors which help to pinpoint unbalance locations.

One of the newest balancing drives is a jet of air. This air jet blows against vanes or blades on the rotor. The operator adjusts the air-control valve until the desired speed is obtained.

Speed builds up the nemesis in an unbalanced rotor. A small unbalance of 1 oz-in. exerts a force of slightly over 1 oz at 200 rpm. This same small unbalance exerts an uncontrolled force of about 45 lb at 5000 rpm. At 10,000 rpm, this shaking force becomes almost 180 lb.

Thus, every time the rotational speed is doubled the destructive centrifugal force is multiplied by four times its previous value.

Appearances Are Deceiving—The appearance of a part doesn't give any indication of its balanced condition. A rotating part, even though it's machined to close tolerances, may be unbalanced.

If a rotating part is allowed to operate in an unbalanced state, the force of vibration creates new unbalance problems. This force throws the part further out of balance. It can also affect the balance of adjacent parts. End result is severe vibrations which cause premature machine failure.

Automated balancing combines correction and detection processes. After loading, a rotor or its individual parts is measured and corrected. Then final balance is checked.

How To Prolong Press Tool Life

Press tools last much longer when they're designed properly.

You should know when to harden tool members and exactly what hardness to use.

■ There are no set rules that govern the hardening of press-tool members. For this reason, much time and energy is usually wasted by toolmakers and engineers. Their talks often rotate around the question, "Should a given die plate or punch be hardened, and if so, to what hardness?"

To clear these points, there are some common rules of practice that may be followed.

When to Harden—Cutting dies, both die plate and punch, must be hardened when the stock thickness is 1/16 in. or heavier. Materials having shear strengths over 40,000 psi also need hardening.

If the stock is soft and thin, only one of the cutting members must be hardened; the other may remain soft. It is not a mistake, however, to harden both cutting members. It's also good practice to leave one cutting member soft when the tool is unmounted.

When perfect alignment isn't assured, the metal-to-metal contact between punch and die plate may cause an accident. In such cases, the effects of the accident are minimized when one die is left unhardened.

Forming-die members are hardened only for protection against wear, particularly in the case of high-production tools.

Which Are Hardened — If one cutting member is to remain soft, choose the punch rather than the die plate. A hardened die plate will serve much better under cutting stresses.

The hardened plate also resists wear and friction better when the workpieces slide from one cutting station to the next.

There are, however, rare cases where the punch is more complex and more expensive to make than the die plate. Where such is the case, harden the punch and leave the die plate in the soft condition.

For the best compromise of toughness, hardness and wear resistance, refer to the table. It shows the proper hardnesses for press-tool components for most types of work.

Fit the Correct Hardness to the Tool

	Hardness, Rc
CUTTING TOOL MEMBERS	
Die Plates for soft thin stock—regular cutting openings	60 - 63
For complicated cutting shapes and/or thick stock	57 - 60
Blanking Punches	57 - 60
Piercing Punches	59 - 62
FORMING TOOL MEMBERS	
Bending Stamps	63 - 66
Drawing Dies	60 - 62
AUXILIARY TOOL COMPONENTS	
Pilots	57 - 60
Gage Pins	63 - 66
Backing Plates	44 - 48
Stripper Bushings	57 - 60
Accessories—subjected to max tensile loads	60 - 65
Accessories—subjected to maximum compressive loads	52 - 54

How to Make Simple Bend Tests

Practical Approach Pinpoints Sheet Metal Ductility

Before you start forming sheet metal, it's essential to find out as much as you can about the properties.

If you don't have the equipment, try these techniques.

■ Is it possible to find the ductility of ordinary sheet metal without using the prescribed testing instruments? Yes, it can be done. There are times, too, when it's the only way out. Expensive equipment might be tied up on another job. Or, you might be in a small shop where such an investment might not pay off.

At any rate, you can determine the ductility of sheet metal without the aid of testing devices. Here's how you go about it. Suppose you want to see how adaptable a section of light-duty metal will be in subsequent forming steps.

The trick is to make a simple 180° bend in the metal. You should end up with a fairly large bend radius. Then insert a piece of the same metal between the bent sections.

Compound Bends—Medium-duty materials require that compound bends be performed. Here, it's best to provide small bending radii. However, spacers aren't needed in this instance.

Once heavy-duty sheet metal passes the test, it's ready for deep drawing or deep embossing. This test involves "handkerchief" folding as seen in the drawing. It consists of folding the sheet in the same manner as applied to medium-duty sections. Then it is folded again at 90° from the first bend.

Revealing Clue—In all of these tests, the very appearance of the metal in the folding zone gives the clue to its properties. At this point, you can see how easily the metal will stand up to certain forming steps.

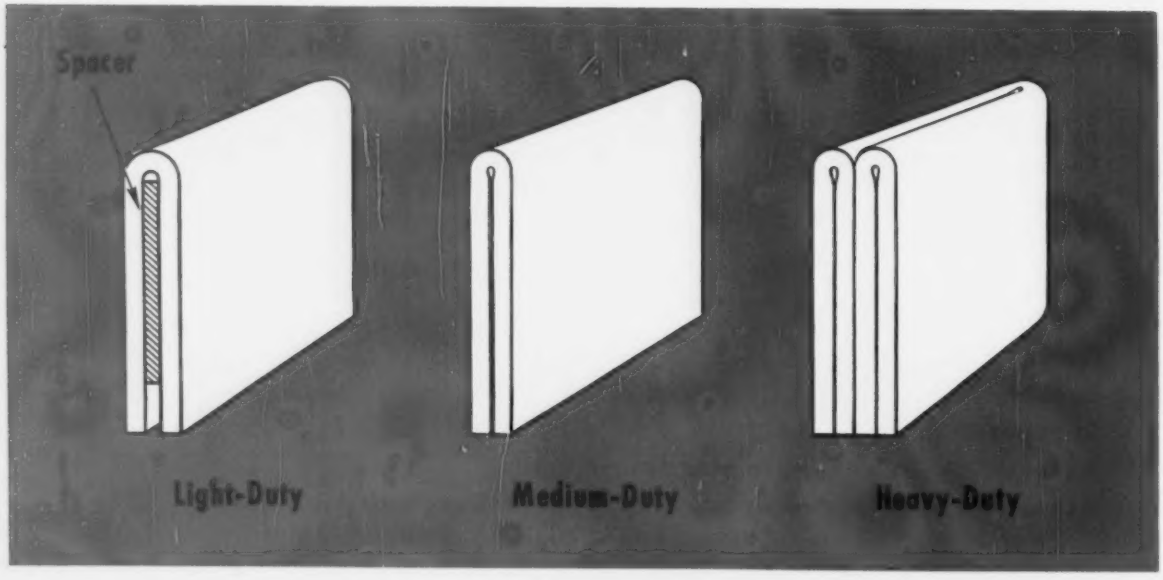
There's also a way to build greater accuracy into the system. All it takes is another piece of sheet metal in which the properties are already known. Put this metal through the same procedure and you have a means of comparison. In this way, you can find the presence or lack of cracks, tearing and "orange peeling."

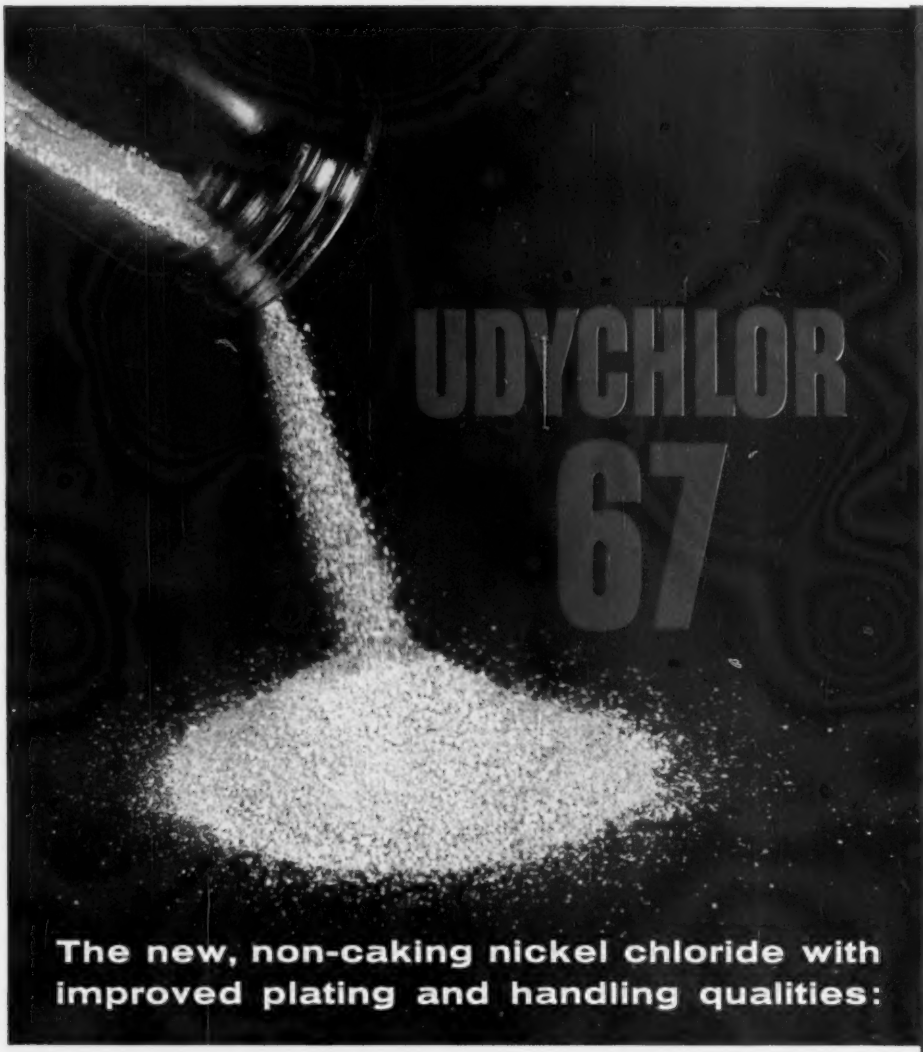
Vise System—There is still another method of testing ductility of sheet metal sections. This involves the use of a vise. First, you insert the specimen in the vise, then pull it into a bend. Make sure you get a small bend radius.

Next, straighten the section and bend it again, but bend it in the opposite direction. This should be 180° from the first bend. Repeat this system of alternate bending until the sheet metal breaks.

Find out how many bends are made before rupture occurs. Then compare this number with sheets of known quality. This will give you an idea how the sheet metal will behave.

Three Ways to Prepare Ductility Samples





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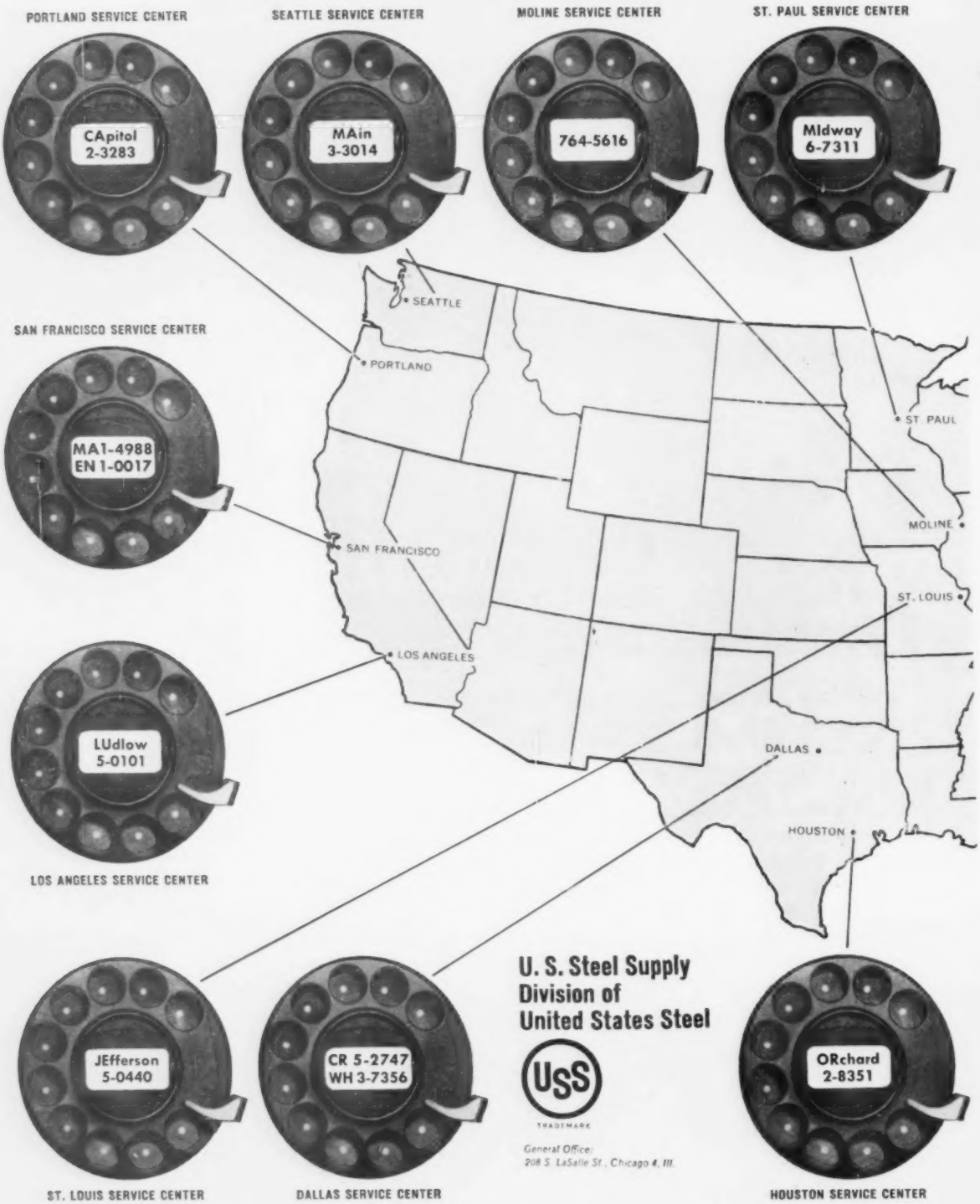

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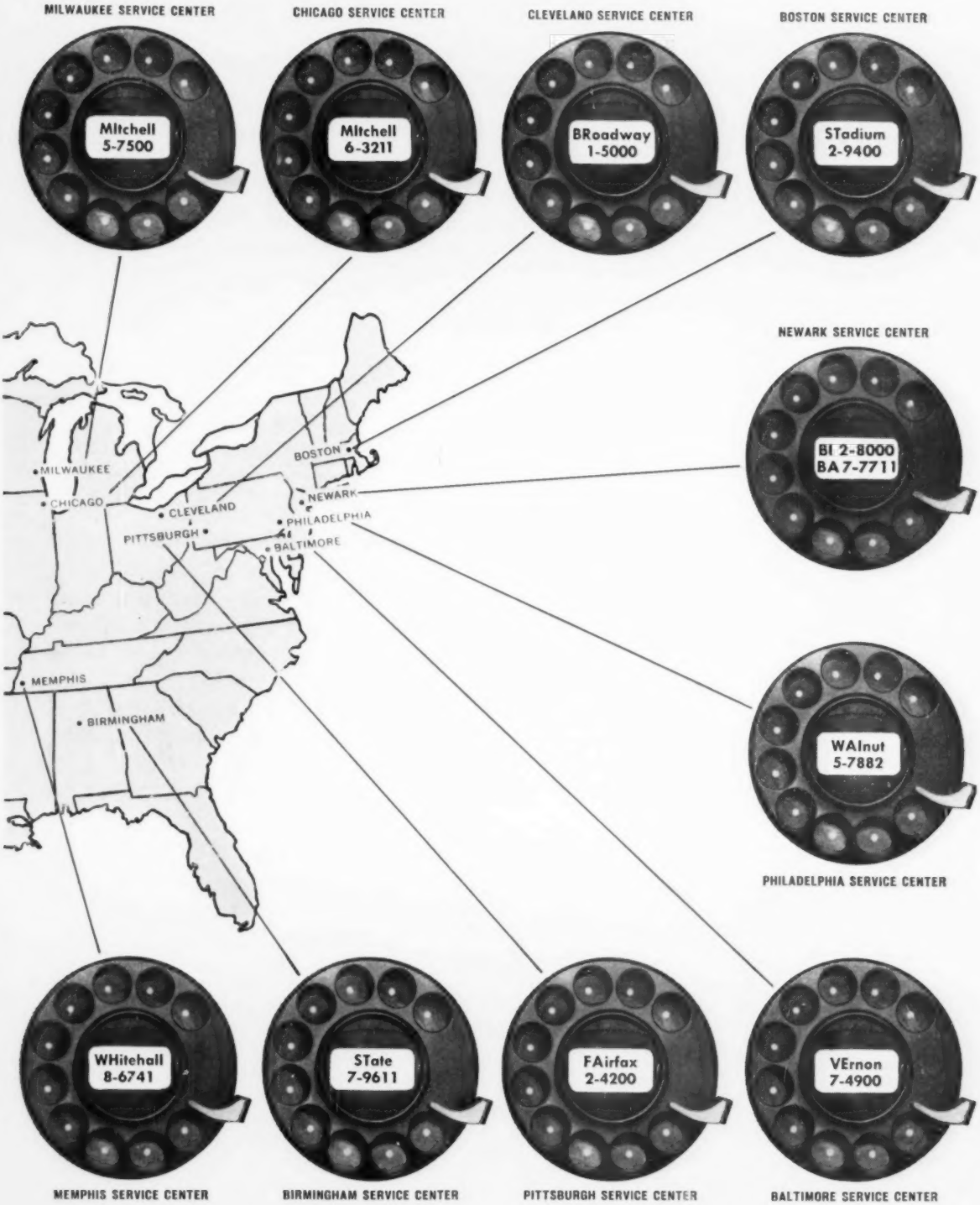
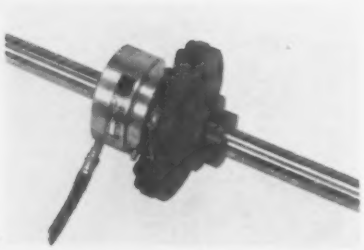


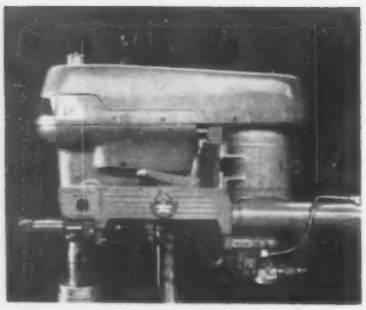
New Materials and Components



Clutch Offers Unusual Mounting Arrangement

For applications up to 10 hp, a line of clutches provides shockless starts without overheating. A special feature of the line is its mounting arrangement. The clutch permits attachment anywhere on a shaft or to a motor. It operates on static air pressure. The clutch is made to hook up with "V" belts. It can also be pilot mounted for special sheaves and sprockets. The unit is both a clutch and motor sheave. (Horton Mfg. Co., Inc.)

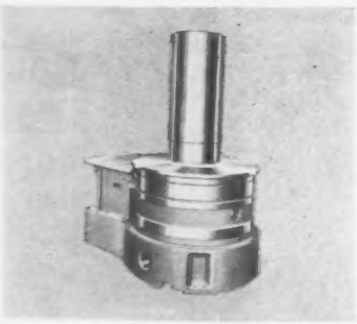
For more data circle No. 25 on postcard, p. 95



Air Powers Line of Drill Press Feeds

Electrically and mechanically controlled, drill press feeds find their control in the manufacturer's precision air valves. This provides rapid advance to the work and the correct drill point thrust. In addition, highly-accurate depth control and rapid withdrawal are possible. Drilling-tapping models tap direct from a standard drill chuck or multiple drill head. This eliminates use of tapping heads, clutches and leadscrews. The mechanical model has a cast aluminum housing for the power transmission system. The housing increases the ruggedness of the unit. (Beckett-Harcum Co.)

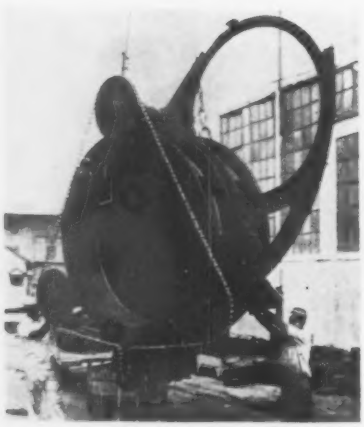
For more data circle No. 26 on postcard, p. 95



Indexing Chassis Serves As a Basic Unit

Including motor, drive and clutch, a turret indexing machine chassis provides intermittent motion for multiple-station operations. It has a stationary column for inboard tool mounting. The 18-in. diam center post makes the unit adaptable for automatic drilling, tapping, reaming, milling, processing and assembly operations. The tools must lend themselves to overhead center mounting. A 3-in. diam center hole in the post accommodates wiring and piping service to tools mounted on the stationary column. The chassis comes with 6-32 work stations and a wide variety of indexing speeds. (Swanson-Erie Corp.)

For more data circle No. 27 on postcard, p. 95



Goggle Valve Cuts off Gas Mains in Steel Mills

Used in steel mill gas mains, a mechanical goggle valve features all-welded, stress-relieved valve bodies. The jackscrews are made of chrome nickel alloy for maximum toughness and strength. The goggle plates and plate seats are replaceable while the valve is in service. Two identical weldments make up the valve body. The weldments can withstand a clamping stress of 100 lb per linear inch of sealing circumference. Machined as a unit, the two weldments insure parallel seating surfaces and leak-proof operation. The goggle valves range in size to fit gas mains from 24-108 in. in diam. Hand or motor can operate these valves. All the bolt holes of the goggle plates are jig drilled. Consequently, the parts are interchangeable and replaceable. The valve has been shop tested under conditions of elevated temperature and pressure. (Koppers Co., Inc.)

For more data circle No. 28 on postcard, p. 95

Cut-Off Wheel

A cut-off wheel features cutting action on both sides as well as the face of the wheel. The three-sided abrasive action reduces heat-producing metal burning friction very much. The wheel grinds its own clearance. It produces a faster cut with much less burn and burr. (American Emery Wheel Works)

For more data circle No. 29 on postcard, p. 95

Live Center

Excessive loads are provided for in a live center. The device has a flush ground tandem ball bearing. This gives double thrust capacity. Points are made of chrome nickel alloy steel, hardened and ground true with the bearings. (Sturdimatic Tool Co.)

For more data circle No. 30 on postcard, p. 95

Delivers Liquid Flow

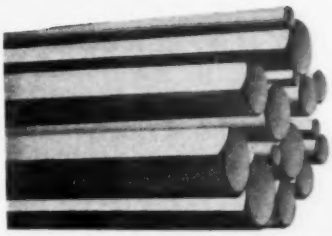
Heavy-duty dispensers deliver a full flow of oil or other liquids by gravity, when valve is opened. The liquid flows through ¼-in. OD Nylon or metal tubing from a central location. The flow stops when the valve closes. Other single or multi-

ple sight feed valves should be used for adjusting the rate of feed. The dispensers come in two types—manually controlled and electric solenoid operated. When energized, feed starts instantly. When current is off, feeding stops. (Trico Fuse Mfg. Co.)

For more data circle No. 31 on postcard, p. 95

Work Holder

Time saving, a multi-position work-holding device accepts work quickly. It allows the work to be



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Titan carries in stock 3,000,000 pounds of Free-Cutting Brass rounds (1/16" to 12"), hexagons (⅛" to 4½"), rectangles and squares, half-rounds, half-ovals, angles and octagons; Naval Brass, Free-Cutting Commercial Bronze, and Leaded Nickel Silver rods.

Free-Cutting Rod sizes over 1/16" to 2¼" are chamfered on both ends and are in uniform 12 ft. lengths for faster and more economical operation of automatic screw machines.

Special Titan tempers and modified free-cutting brass alloys are designed for machining in conjunction with severe knurling, deep thread rolling, deep roll stenciling, spinning, staking, flattening, bending, or flaring and expanding.

Titan depot facilities also allow quick delivery on orders of Titan brass, copper and aluminum forgings, bronze welding rods, brass wire, brass pressure die castings.

May we say more? Call Titan's nearest office, distributor or depot for outstanding brass service.

Write us on your letterhead if you wish to receive the weekly stock list of the Titan Brass Mill Depot in your area.

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How the choice of a cutting fluid affects your costs

Often—perhaps *too* often—the supplier of cutting fluids for machining or grinding, points to the quality of the work and totally ignores its surprising counterpart—a lower over-all cost of operation.

Many a user of petroleum-base fluid might never notice the oversight. A better fortified coolant, which costs more per gallon, would not seem to reduce the final cost of the work, although it can readily be proven to produce better machined parts.

But it is pertinent to examine more closely the cost factors. The facts may surprise machine shop men who have not fully considered all the items which influence their costs. The measurable, tangible cost factors are these:

- Initial cost
- Cost of mixing
- Production rates
- Tool or wheel life
- Machining cost
- Overhead
- Cost of cleaning
- Life of the fluid
- Cost of rejects
- Reworking costs caused by rust

A comparison of first cost with final cost per piece, made on the basis of long experience with both conventional water-soluble oils and the newer chemically conceived fluids reveals some astonishing figures. Just a quick glimpse:

- The modern fluid costs about four times as much as the old soluble oil.
- But that modern coolant can be cut with three times as much water as the oil-base fluid.
- The modern coolant requires less make-up.
- It lasts over six times as long as the oil emulsion—contains nothing to make it turn rancid.
- It enables faster production—machines can be speeded up.
- It requires less frequent emptying and cleaning of machines.
- The over-all cost of coolant per piece produced has repeatedly proved

to be upwards of *40% less* with a good chemically conceived coolant than with a conventional soluble oil!

There are intangibles, too, which are not as measurable, but which affect both cost and quality. To mention a few: Cleanliness of shop, operator satisfaction, visibility of work, smoke problems, accuracy of work, adaptability to a wide range of jobs, and safety (fire hazard, slipperiness of floors, etc.).

It is illuminating to examine all of these direct and indirect influences a cutting fluid can exert. Little wonder that it is termed the "third leg" of the base on which successful machining depends—the others, of course, being the tooling and efficiency of the machine itself.

Our concern is with the fluid itself, because Houghton has made and supplied many types through the past half-century.

Our recent successes have been with the chemically conceived types of coolants, scientifically fortified to do a double job of improving quality *and* cutting final costs. *Hocut 237* is a perfect example of such a coolant. Data on its applications and availability will gladly be supplied. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION

KEYSTONE WIRE
for vital parts of BISSELL® Sweepers

Bissell Inc., world's largest manufacturer of carpet sweepers, with a global reputation for quality, specifies Keystone Wire for the vital parts of their Bissell Carpet Sweepers.

In this popular model, the axle rods are made of Keystone Silver Brite Galvanized Wire; the sturdy brush bristles are anchored in a solid wood roller with staples made from Liquor Finish Stapling Wire. Keystone high carbon Spring Wire is specified to absorb the flexing action of the wheels.

Walter Bradcoski, Senior Buyer, says, "Keystone Wire has always met our requirements exactly and is used in all our sweepers."

Keystone Wire Specialists have developed wire with correct thermal treatment, chemical analysis, surface and uniformity for Bissell Sweepers. These metallurgical engineers who know wire thoroughly, are always ready to offer you their experience to help you modernize your wire needs. They will recommend the wires best suited for your requirements. Call them soon...it could be a profitable contact!

Keystone Steel & Wire Company, Peoria, Illinois

Sweeper rotary brush is made with Keystone Brush Twisting Quality Wire.

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this new booklet on Carlson services in stainless steel gives you worthwhile facts!

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DESIGN DIGEST

accurately positioned even to use with machine tools. The tool proper consists of two parts. They are: a vise head and a positioning base. The vise head rotates 360° on any tangent to a half sphere, to achieve any compound angle. It may also be tilted a full 180° front and back. The locking mechanism also rotates 360° around the base. After the desired angle is determined, tightening a single clamp knob clamps all parts against movement. (Colbert Die Cast Co., Inc.)

For more data circle No. 32 on postcard, p. 95

Takeup Frames

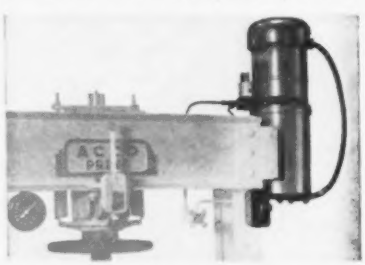
Multi-bearing takeup frames allow horizontal bearing adjustments from 6-24 in. They will mount 143 different pillow blocks with shaft sizes from ⅝ to 2-7/16 in. in diam.

The takeup frames accommodate any type of bearing—babbitted, bronze, ball or roller—in any two-bolt pillow block. (Link-Belt Co.)

For more data circle No. 33 on postcard, p. 95

Electric Drive

An electric drive conversion kit makes it possible to convert a manual or air driven company hydraulic



press to electrical operation. It offers ease of control and the quick response under loads permitted only by an electric drive. It operates from a 110-v ac power supply. A needle valve provides stepless speed control. (American Chain & Cable Co., Inc.)

For more data circle No. 34 on postcard, p. 95

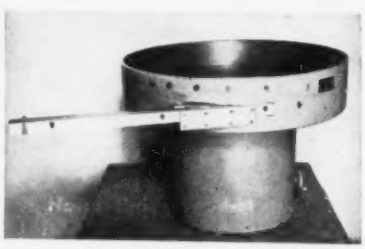
Burnishing Compound

For barrel-finishing zinc die castings, a burnishing compound holds better color. The free-flowing, soap-type compound also maintains color on steel and most alloys. Frequently, a relatively small amount of the compound can be used in the cut-down cycle. Then, without rinsing the load, more compound can be added for the burnishing cycle. This saves one step in barrel finishing. (Minnesota Mining and Mfg. Co.)

For more data circle No. 35 on postcard, p. 95

Parts-Feeder

For feeding operations, a high-speed parts-feeder is 30 in. in diam. It also orients and counts a large variety of objects. Speeds go as high as 3000 parts per minute. The device adapts for continuous feeding of parts or for mechanical releasing of one or more parts at a time. It can also be set up for electronic batching or counting. The machine also slows down for gentle han-



dling of fragile parts. It changes over from one size to another in a matter of minutes. (Count-O-Matic, Inc.)

For more data circle No. 36 on postcard, p. 95

Toggle Clamps

Air- or hydraulic-operated toggle clamps are designed for rapid sequence of assembly operation on light jobs. They can be used in hard-to-reach areas. The clamps feature over-center toggle locks. These eliminate bounce or recoil. (Detroit Stamping Co.)

For more data circle No. 37 on postcard, p. 95

Only Carlson produces all plate thicknesses in all these superior grades of stainless steel

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317L
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D319L
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IN addition to the more usual grades, Carlson regularly produces stainless steel plate and plate products in this wide range of superior analyses in any thickness. Many of these grades are included in our mill inventory; the others can be rolled to your order.

These chromium-nickel analyses were developed to more closely match the exact requirements of process, nuclear, and space equipment. Each has one or more of the following advantages: increased corrosion and/or heat resistance, good machinability, ease of fabrication, and exceptionally high physical properties with low temperature heat treatment. By selecting the grade that gives you the combination of advantages you want, your costs can be reduced and the trouble-free life of your equipment extended.

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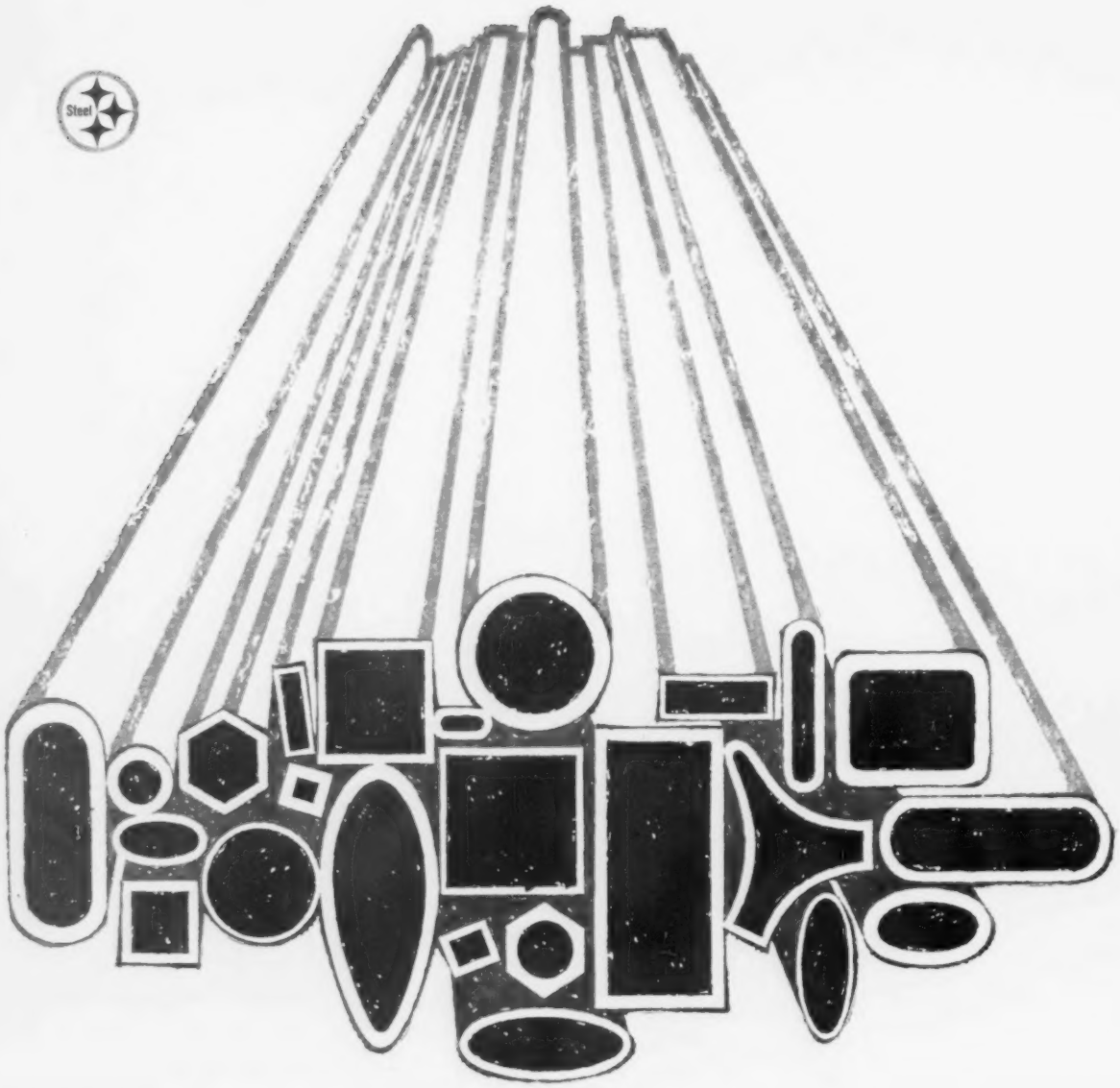

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The Standard Tube Co.§‡
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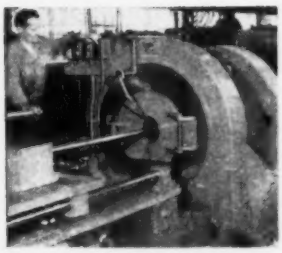
The quality producers at left are prepared to help you design with tubing in all weldable grades of carbon, stainless steel and other alloys. You can get useful information from any of them or by writing Dept. IA-1, Welded Steel Tube Institute, Inc., Hanna Building, Cleveland 15, Ohio. It will pay both you and your customers — in uniformity, safety, and savings in weight.

WELDED STEEL TUBE INSTITUTE, INC.



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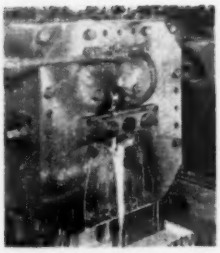

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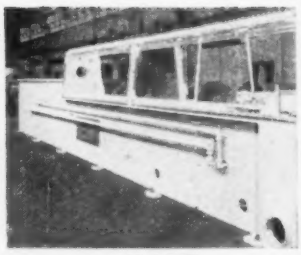

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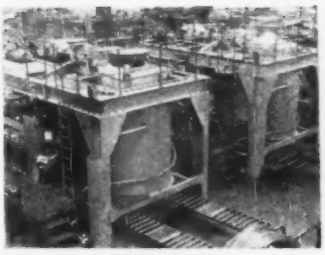

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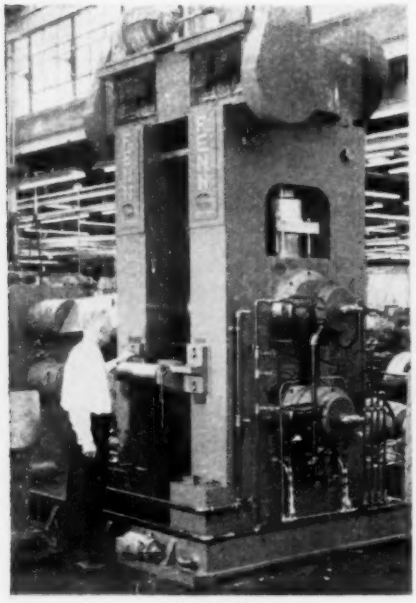

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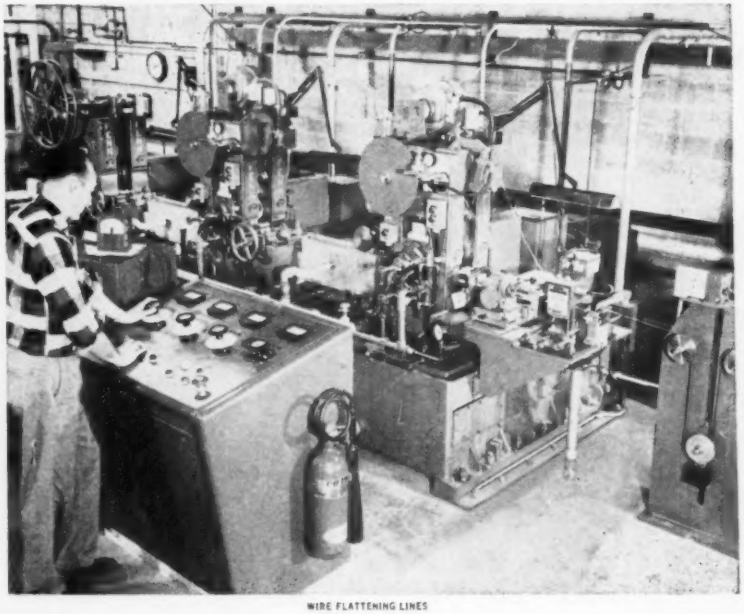

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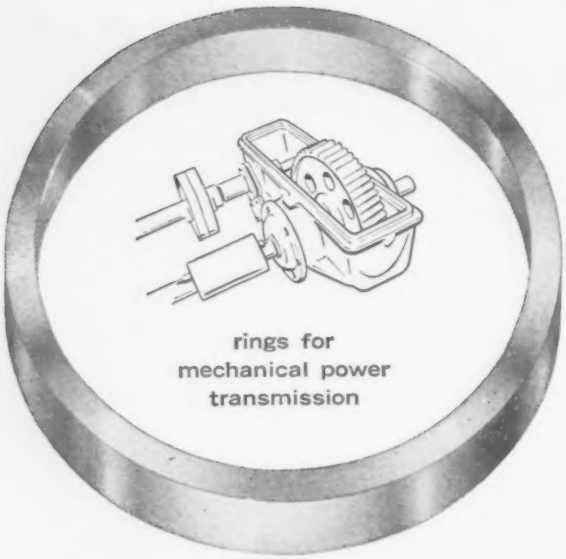

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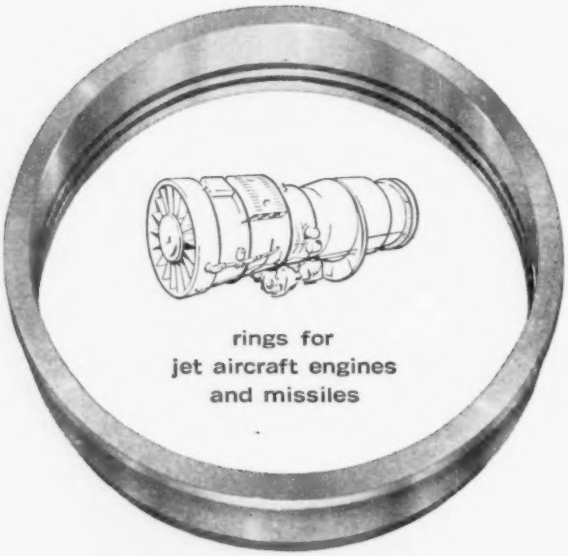

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Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

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A six-page brochure illustrates and describes a line of light-heavyweight 17-in. drill press equipment. Included in the brochure are 19 illustrations, specification data, charts and tables on all features of the line. (Rockwell Mfg. Co.)

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Metal Stampings

A bulletin deals with metal stampings in small lots. Most interesting is a page of suggested basic designs. (Dayton Rogers Mfg. Co.)

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Enameled Aluminum

Questions and answers about porcelain enameled aluminum are contained in an eight-page booklet. (For free copy, write on company letterhead to Reynolds Metals Co., Dept. PRD-41, Richmond 18, Va.)

Spring Fasteners

Standard and special spring fasteners, in twin-prong or cone-type impressions, are illustrated in a 13-page catalog. Push-on types are also dealt with. Pertinent design requirements are also given. (George K. Garrett Co., Inc.)

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Transmission

A two-page catalog includes engineering data and complete specifications of a transmission with an electric shift. Electro-magnetic clutches provide speed changes and reversing under power, without interrupting the power source. (Western Mfg. Co.)

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Concentric Grinder

Fully illustrated and described in a four-page bulletin, a 4-in. concentric grinder possesses a new concept in work holding. (Landis Tool Co.)

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Microcircuitry

Performance data, on the materials used in thin film integrated circuitry, is contained in a technical data sheet. This integrated circuitry is for use in microminiaturization of circuits. (Halex, Inc.)

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Metalworking Tools

Fully-illustrated, a 24-page catalog covers a complete line of cold-heading, forming and cutting tools. The catalog also describes the recently expanded production facilities of the manufacturer. (Plew Tool Corp.)

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Structural materials for aerospace applications are discussed in an eight-page booklet. Development facilities for pure metals, alloys, ceramics and plastics are described in the publication. (Westinghouse Electric Corp.)

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uses. Also included is a diagram of the lead-lithium system. (Foote Mineral Co.)

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Beryllium Copper

The use of beryllium copper, for non-sparking trolley wheels in industrial application, is described in an application bulletin. (The Beryllium Corp.)

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Testing Machine

Operation, ease of installation and construction are some of the items discussed in a brief brochure on a universal testing machine. Photographs and specifications supplement the text. (Wiedmann Machine Co.)

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Plastic Reinforcement

For use as a reinforcing agent in plastic molding, a special grade of asbestos fiber is described in a technical bulletin. The bulletin contains complete data on properties and physical characteristics of the reinforcing agent. (Johns-Manville)

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Small Parts Cabinet

A catalog sheet describes a line of multi-drawer small cabinets for storing a variety of small parts of all sizes and shapes. The catalog sheet incorporates specification tables with information on dimensions, construction material, colors, and weight. (Durham Mfg. Co.)

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Tube Fittings

With illustrated specification tables, a catalog details a line of tube fittings, accessories and typical applications. Featured is the patented O-ring seal line. (The Lenz Co.)

For free copy circle No. 14 on postcard

Steam Heating Coils

Steam heating coils are dealt with in a 24-page publication. It is complete with many photographs and drawings. The booklet contains sections on construction details, selection, performance, piping diagrams and installation procedures. (Westinghouse Electric Corp.)

For free copy circle No. 15 on postcard

Metal Spinning

New advances in metal spinning are discussed in an eight-page brochure. The brochure also features the complete spinning and fabrication facilities of the company. (C. W. Torngren Co.)

For free copy circle No. 16 on postcard

Spraying Systems

An eight-page, illustrated catalog describes centrifugal-type, electrostatic, paint spray systems and equipment. (Ionic Electrostatic Corp.)

For free copy circle No. 17 on postcard

Drum Handling

Newly developed features of a mechanical fork truck attachment are covered in a four-page brochure. The bulletin shows the attachment's ability to handle drums of all sizes; also its facility for inverting drums for floor dumping. (Kughler Development Corp.)

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Spindle Repair

A bulletin describes the company's facilities for fast repair or rebuilding of all makes of spindles. The bulletin contains "before and after" illustrations demonstrating the kind and quality of repair work. (Pope Machinery Corp.)

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Handles Sheet, Coils

Good reference material, on all types of sheet and coil handling lifters, is provided in a 24-page catalog. Many varied applications of lifters are shown. Graphically illustrated, the catalog also gives details on motorized swivels and other special lifters. (Cullen-Friestedt Co.)

For free copy circle No. 20 on postcard

Analyzes Top Gas

Complete information, about equipment for continuously analyzing blast furnace top gases, is given in a four page data sheet. It explains the advantages of top-gas analysis. The publication also describes how the equipment is applied for reliable measurements. (Leeds & Northrup Co.)

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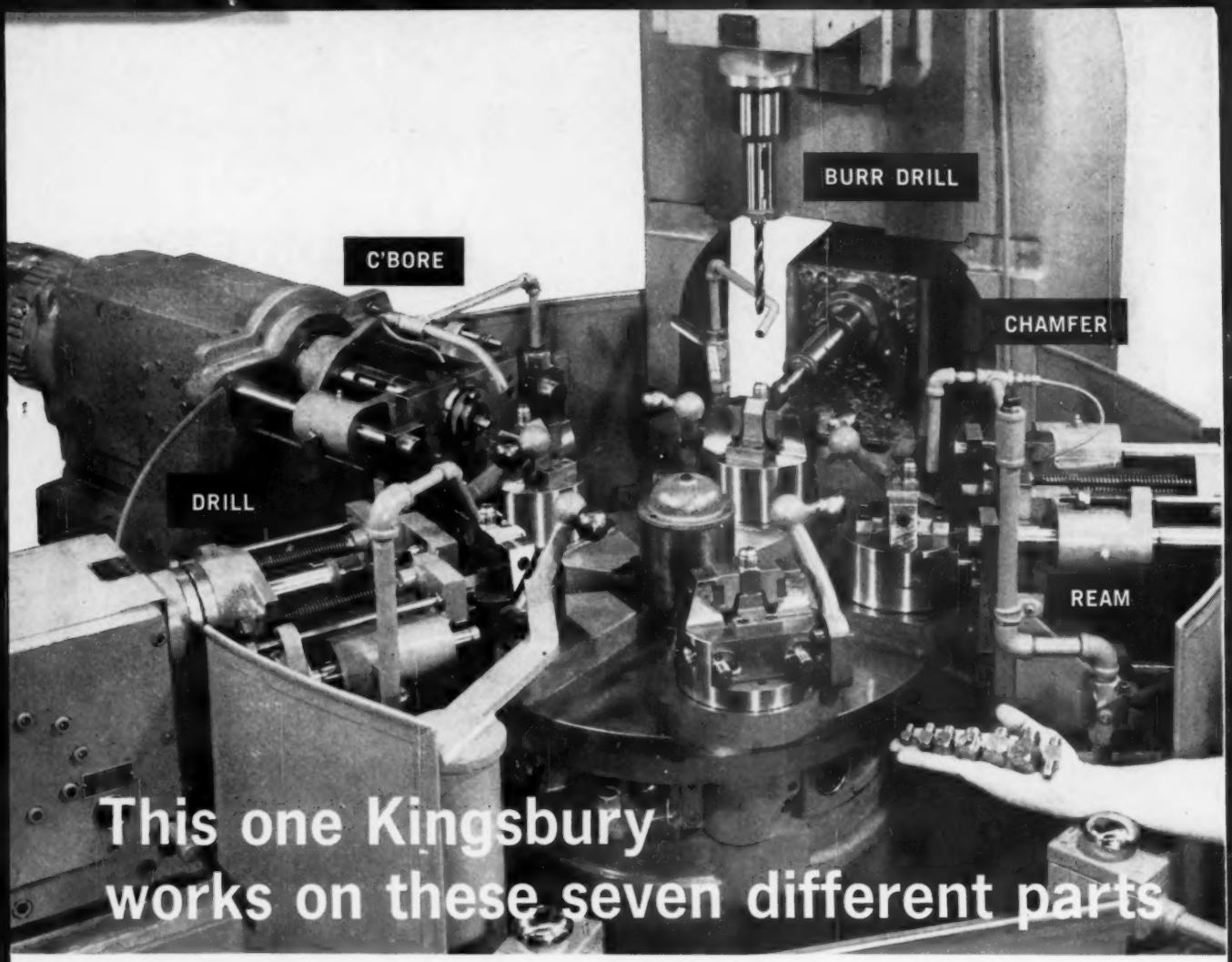
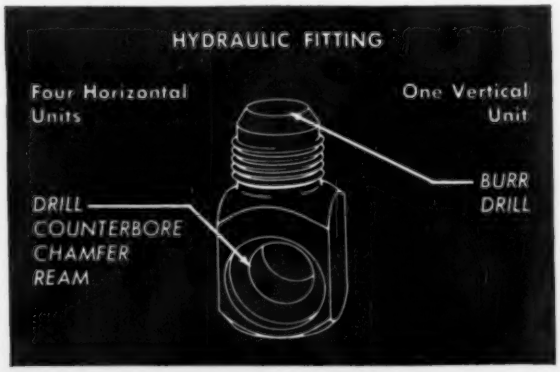


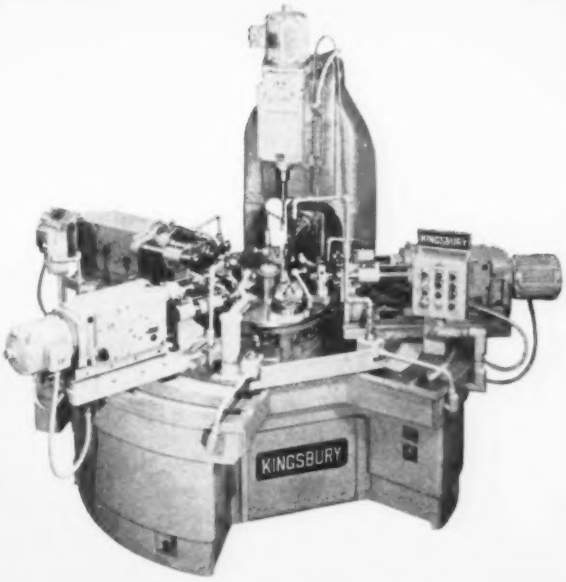
This one Kingsbury works on these seven different parts

This Kingsbury machine is fairly simple — just five units and six stations. The work pieces are held in two-jaw chucks with interchangeable locating jaws and clamps. The gross production rate for five parts is 500 parts per hour. On the sixth part it is 340, and on the seventh part with two chuckings it is 250 per hour.

Normally our machines are far more complex than this. But this one does show that our simpler machines also pay off. With good basic design and rugged accurate construction, they have little downtime. And uniform, accurate cycles produce little scrap.

May we quote you on a job, either simple or complex? Kingsbury Machine Tool Corp., Keene, New Hampshire.





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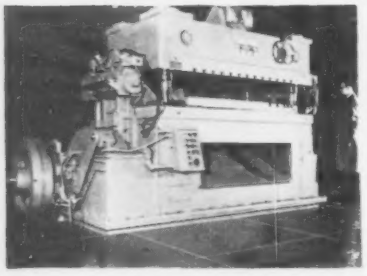
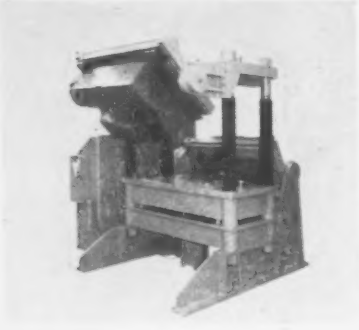
New Equipment and Machinery



Machine Does Many Operations in One Sequence

Equipped with progressive dies, a double-crank dieing machine makes it possible to combine many complex stamping and forming operations. It combines them into one progressive production sequence. This high-production machine is a double-crank arrangement that supports the upper crossheads at both ends. This results in rigidity and strength against off-center loading flexibility in the ratio of die-bed area to press capacity. (Koehring Co.)

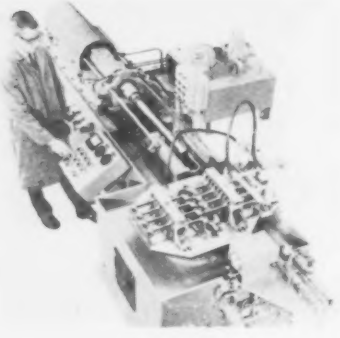
For more data circle No. 38 on postcard, p. 95



Die Tilter Ends Die and Mold Room Bottlenecks

A die tilting unit safely speeds up spotting-in time on dies and molds up to 70 pct. Here's how it works. An elevating bed and lower platen ride on four 4-in. diam guide bars. The crown is stationary. Die halves are secured to movable platens. They roll down easily from the crown and bed to tilting position. Once out, the platens rotate at the touch of a button. Upper and lower platens swing in a vertical arc as much as 220°. Each platen locates and locks at the desired angle for spotting-in. The unit is useful for die casting, blanking, form and drop forge die spotting-in operations. (Sanders Tool & Production Co.)

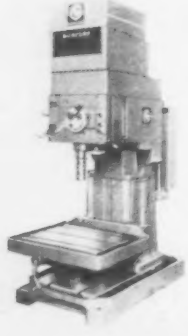
For more data circle No. 39 on postcard, p. 95



Machine Microhones Stacked Workparts As One

Designed to incorporate the abilities of microhoning, a machine also gives high-production rates of a single-spindle, multiple workpiece operation. With proper fixturing, workparts with short bores can be horizontally stacked adjacent to each other. Their bores can be microhoned as though they were one. Eight parts can be stacked in the microhoning position, and eight in the load-unload position. The hydraulically - actuated spindle - in - quill feature permits rapid stock removal at close tolerances. The head unit has a 16-in. withdraw. This permits full use of the maximum 16-in. spindle stroke. (Micromatic Hone Corp.)

For more data circle No. 40 on postcard, p. 95



Upright Drilling Machine Has Rugged Head

Having unusual rigidity, a 30-in. upright drilling machine takes on large, tough jobs. It also machines all jobs in less time than smaller, conventional upright drills. The drill machine has a husky, preloaded, four-bearing spindle with 14-in. of travel and a close-coupled, 10-hp motor. Standard machine features contribute to greater operational speed. They are: an extra-wide choice of speeds and feeds; electric and hydraulic controls; automatic electric tapping reverse. Also included are a magnetic clutch that never needs adjustment and an adjustable hydraulic spindle counterbalancing. The tapping reverse operates automatically to any preset depth. The machine also features as standard a number 5 Morse taper for larger tooling. (Giddings & Lewis Machine Tool Co.)

For more data circle No. 41 on postcard, p. 95

Drill Sharpener

For high-speed steel twist drills, a drill sharpener speeds the sharpening rate three to seven times faster than conventional grinding. It doesn't generate any heat that may alter the structure of the metal. A simple setup of drill holding fixtures makes possible

a greater degree of control of drill point geometry. The versatility of the unit allows all drill point angles from 90°-180°; lip relief angles from 0° to 20°; helix angles from 30° positive to 30° negative. (Connecticut Special Machine, Inc.)

For more data circle No. 42 on postcard, p. 95

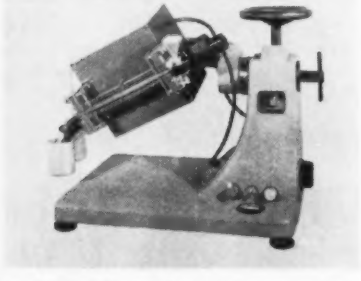
Inert Gas Welder

With 100-pct arc stability, an inert gas welder welds large weldments down to fine wire. It is particularly adaptable to welded-wire modules. The machine is fully resonated. There are four overlapping current ranges from ½-425 amp. Exotic metals and different sizes and weights of metals can be welded. (Susquehanna Sciences, Inc.)

For more data circle No. 43 on postcard, p. 95

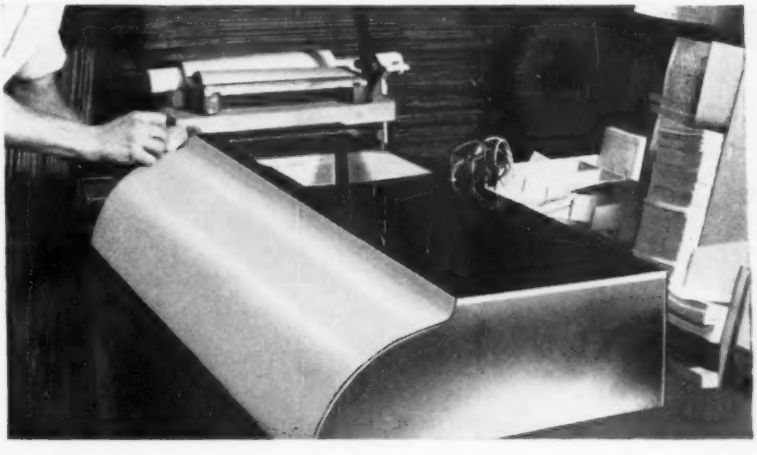
Laboratory Separator

The separation of predominatingly ferromagnetic mixtures is the



purpose of a laboratory separator. The mixture is fed down a vibrating

from die to delivery with no repolishing!



metal formed without a scratch when covered with protective

TAPES FROM 3M

Now you can stamp, blank or fabricate highly polished metals by first covering the area to be worked with "Scotch" Brand Protective Tape. Even light draws may be made without die-marking the finished surface. Nor is repolishing necessary. On most products, the tape can even stay-put up to point of use.

TRY THIS METHOD. See for yourself how "Scotch" Brand Protective Tapes save both time and rejects in your plant. Ask your nearest "Scotch" Brand Tape Distributor to show you how, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn. Dept. IBU-11.

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...where research is the key to tomorrow

3M COMPANY

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Anaconda takes to the road with ideas for greater values and higher productivity

We're in the market with ideas. Ideas for doing new jobs—like making transistor bases and fluid-cooled conductors. Ideas for doing present jobs better—helping you match the metal to the job more precisely so that you can offer equal or greater value *and* reduce total costs.

These ideas are embodied in Anaconda's line of copper, brass, and bronze mill products, the broadest in the industry—and in the vast pool of experience and technical knowledge of Anaconda men.

To put these ideas to work we've taken to the road with a traveling value-analysis clinic, stopping in industrial centers all over the country. We've a truckload of displays representing our principal products to serve as starting points for discussions of the ideas. We're detaching specialists, technical men, mill men, executives to discuss and explain the ideas with all manufacturers who can attend the clinics.

We're also busy generating new ideas in an aggressive research and development program. And we plan to make available soon small, balanced value-analysis teams to go out in the field and work with individual company organizations—make specific suggestions and recommendations regarding materials, fabricating methods, design, etc.

Anaconda is on the move. If you have problems in which you think a new approach might help—call your Anaconda American Brass representative. Or write: Anaconda American Brass Company, Waterbury 20, Conn.

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Anaconda American Brass Company

covered chute. An alternating magnetic field is then used. This gives the mixture a certain amount of fluidity. Several times in each second, the magnetic field is switched off for a few cycles. Consequently, the magnetic and nonmagnetic particles constantly shake loose from each other. (S. G. Frantz Co., Inc.)

For more data circle No. 44 on postcard, p. 95

Vacuum Feeder

A vacuum feeder lifts metal sheets from a stack and feeds them vertically to punch-press or other operations. The unit has a ¾-hp motor and variable-speed drive. A complete vacuum system has ½-hp vacuum pump. Vacuum cups

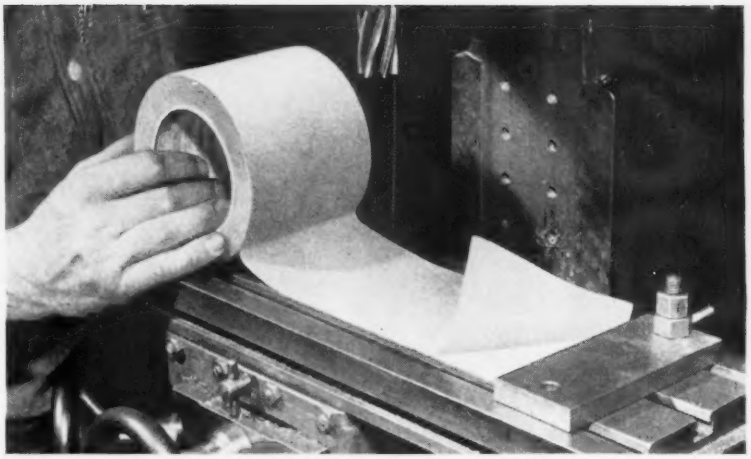
lift a sheet from the stack. An automatic raising arm turns the sheet to vertical position against powered, magnetic feeder rolls. These rolls hold the sheet in vertical position while feeding. (The Union Tool Corp.)

For more data circle No. 45 on postcard, p. 95

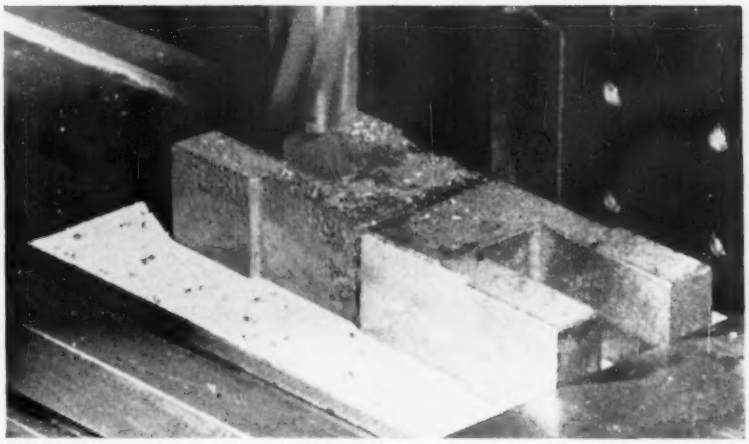
Box Furnaces

Gas fired, oil fired or electrically heated, controlled - atmosphere box furnaces maintain good temperature uniformity. The charge is heated by 100-pct forced convection. The charging door and door plate of the tightly-sealed units are of one-piece, normalized cast meehanite. Dual airdraulic cylinders raise the door. A ceramic fan circulates the protected air. Superalloyed ceramic heating tubes accomplish the heating. (Ipsen Industries, Inc.)

For more data circle No. 46 on postcard, p. 95



holds any metal like a magnet!



lock down nonferrous metals for milling with double-coated

TAPES FROM 3M

Keep nonferrous or small, hard-to-clamp parts where you want them during machining and finishing operations. "Scotch" Brand Double-Coated Tape goes on quickly . . . holds tight even under a flood of cutting fluid. This "tape that sticks on both sides" speeds such operations as cutting, grinding, milling and polishing.

TRY THIS METHOD. Ask your nearest "Scotch" Brand Tape Distributor to demonstrate this and the many other "Scotch" Brand Tapes for masking, surface protection, and metal finishing. Or, write: 3M Co., 900 Bush Ave., St. Paul 6, Minn. Dept. IBU-11.

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Old-time craftsmanship backed by extensive modern facilities (as shown in part) is the reason for Mahon's singular reputation as a supplier of fabricated parts in steel, alloys or aluminum. With Mahon you are sure of a quality product, competitively priced . . . and as scheduled.

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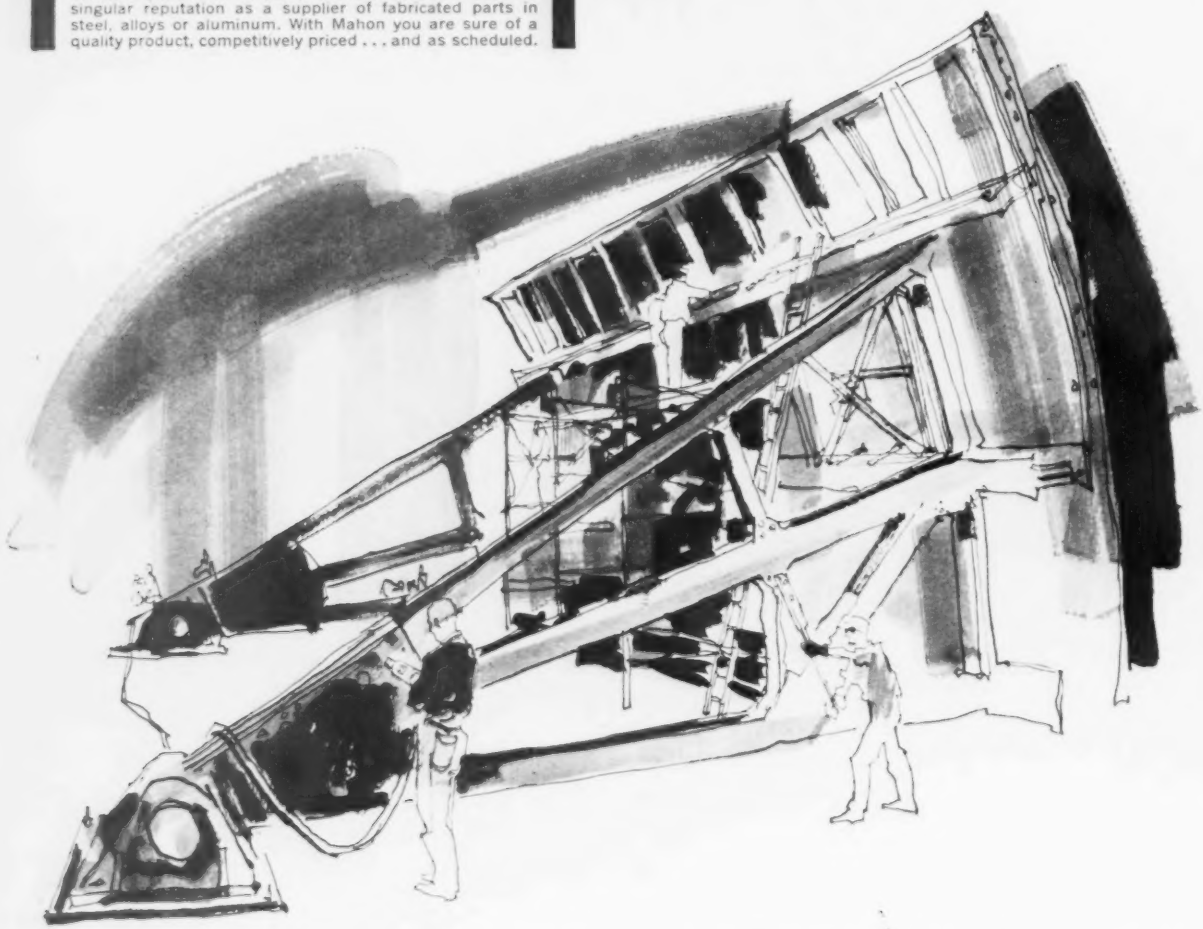

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New Patents In Metalworking

Cupola Furnace

Continuously operable cupola furnace for producing iron having a predetermined carbon content, E. Lobbecke (assigned to Strico Gesellschaft fur Metallurgie und Warmetechnih m.b.H., Gummersback, Germany), Nov. 15, 1960. Design for a continuous cupola furnace capable of reliably producing molten iron of low carbon content; in an accurate predetermined manner. No. 2,960,330.

Pickles, Phosphatizes

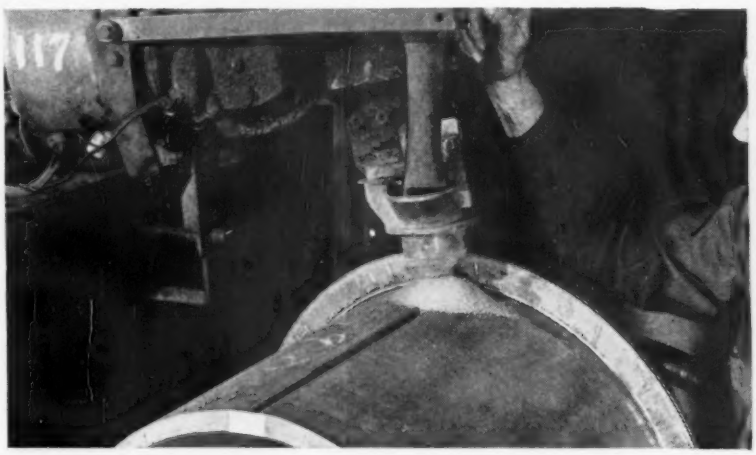
Pickling and rust-inhibiting bath for ferrous metals, and use of same, W. B. Coleman (assigned to Victor Chemical Works, Chicago Heights, Ill.), Dec. 13, 1960. A bath pickles and phosphatizes ferrous metal. It comprises water, sulfuric or phosphoric acid and a small amount of a boron-phosphate rust inhibitor. No. 2,-964,434.

No "White Rust"

Process for treating metals and products, H. T. Francis and F. H. Roebuck (assigned to National Steel Corp., a corp. of Del.), Dec. 13, 1960. In the inhibiting of "white rust" formation on materials having a zinc surface, the material is immersed in an aqueous solution of zinc nitrate and chromic acid at less than 450°F. It is then washed and rinsed. A colorless, corrosion-resistant film is thereby formed on the zinc surface. Nos. 2,964,432-3.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

flux stays put...
air stays out!



smoother welds every time when back-up tool is glass cloth

TAPES FROM 3M

As a back-up material in submerged arc welding operations, "Scotch" Brand Glass Cloth Tape holds flux in . . . keeps unwanted air out. Tape adheres instantly to underside of girth or longitudinal seams for butt, double V and fillet type welds. Its use overcomes need for expensive jigging or other cumbersome back-up methods used to prevent burnout.

TRY THIS METHOD. See how it minimizes your flux waste and clean-up costs. Ask your 3M Representative or nearest "Scotch" Brand Tape Distributor for a demonstration, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn. Dept. IBU-11.

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More and more, manufacturers are finding that their best source of extruded products is their nearby independent fabricator.

One reason—and an important one—is location. Because his plant is near yours, he can work closely with you in planning, pricing and engineering. He can give you convenient production scheduling . . . and assurance of on-time delivery to your plant.

Another reason is his size . . . your business is important to him. He'll go all out to bring his many years' experience to the solution of your problems . . . to give you the quality, personalized service and unit cost that assure your repeat orders. Supplied by Aluminium Limited, your independent fabricator is backed by the research facilities of one of the world's leading aluminum producers.

Ask your aluminum extruder to estimate on your next order for semi-fabricated parts. You'll find him eager to give you the finest aluminum products at reasonable cost. Or, if you prefer, ask us to send you a list of independent aluminum extruders near your plant.

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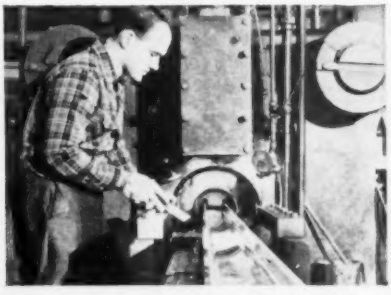
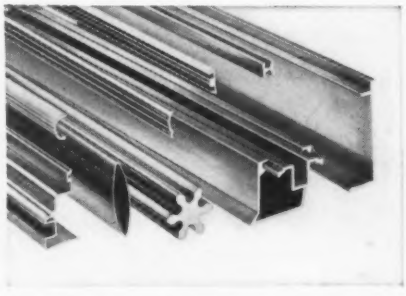


Modern equipment. Investigate the facilities offered by your aluminum fabricator—you'll find him well equipped to serve you. His facilities, experience, location, and his personalized service make him your best source of semi-fabricated aluminum products.



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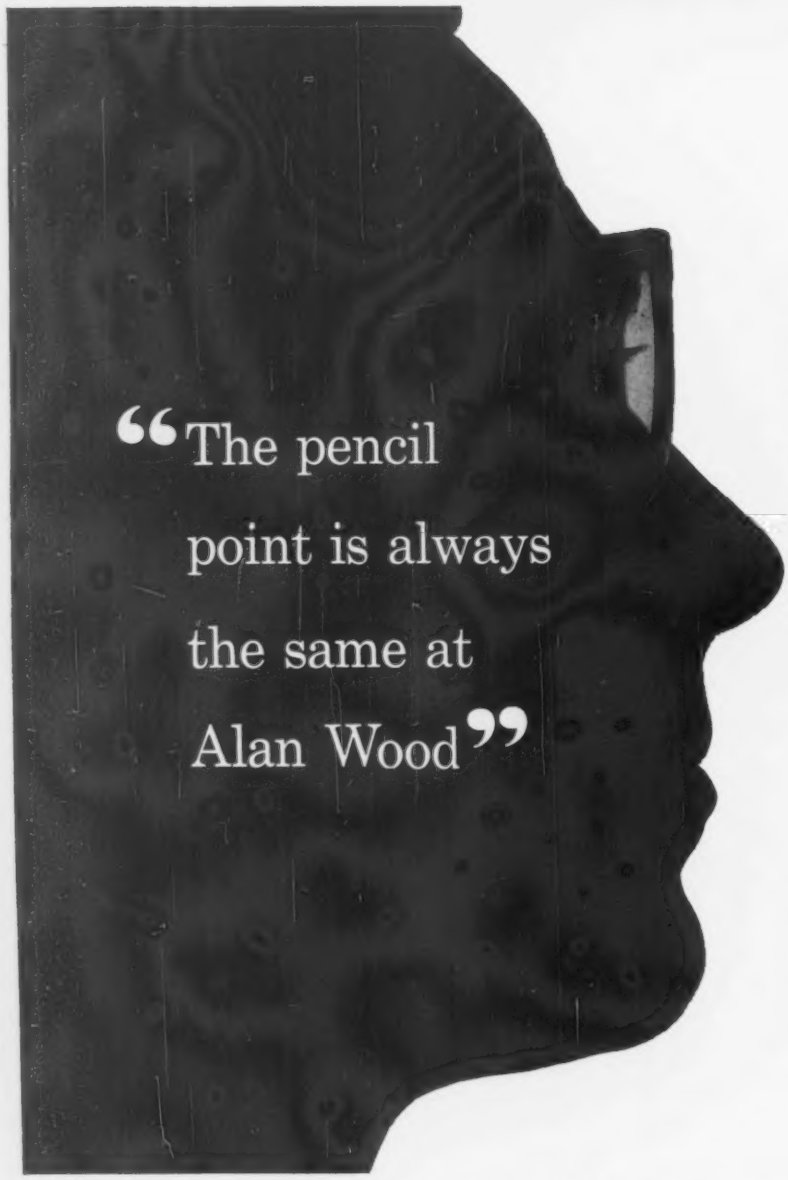

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That's the way one Alan Wood customer said it, and we appreciate the acknowledgement. We do believe in consistent pricing policy. Moreover, Alan Wood is geared to give your order prompt attention without red tape delays. Your quality goes up, your costs and rejects go down, when you use dependable Alan Wood plate, sheet and strip.

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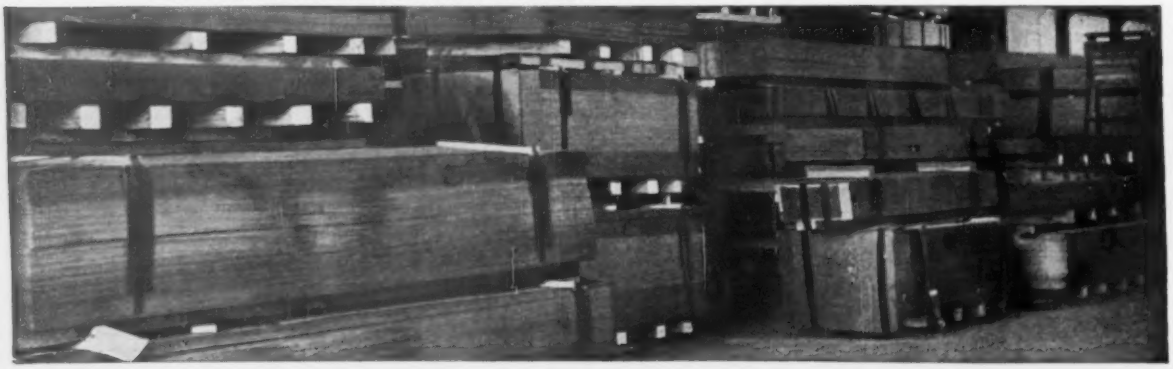

Little Improvement Before March

General orders for steel have shown new life in the past two weeks. But they are offset by more cutbacks from automakers.

If seasonal pickup in automotive orders backs up general gains, March could be a good month.

■ March now shapes up as the first month to show any real improvement in the steel market.

If the current improvement in general ordering is backed up by renewed automotive strength, March can show the first real upturn in orders and shipments in over a year.

Market Standoff — The current market is at a standoff. Improvement in orders from general users has been offset by severe cutbacks from the auto industry. If it were not for the bad news from automakers, January orders would show a substantial pickup.

But with the automotive cutbacks, January shows only a slight gain in total orders over December. At the same time, the market has shifted in character with emphasis away from flat-rolled products.

Who's Buying Now—Pickups in new orders are noted from farm implement makers, appliance makers, oil country goods users and jobbers, general steel users, and for some structural products.

Cutbacks in automotive sheet ordering have hit the flat-rolled market, particularly for cold-rolled sheet. Some improvement in ordering by appliance makers has not come close to making up for the delays in auto steel buying.

Automakers Like March—Some good automotive orders came out of Detroit last week—but for March tonnage. March is now shaping up much better than January-February. Much of the set back tonnage has been booked for March and the rate of ordering for the month looks much better than earlier in the year.

But as long as automotive orders are at a low point, no major gain in the market is likely. This means there will be little change in the total market until renewed automotive orders back up those of general users.

Inventories at Bottom—The rate of pickup in general buying does not show enough strength to carry a major uptrend in the steel market. But it does show that most steel users are now buying for current use, instead of cutting back inventories.

This, in itself, is a good prop in the market and gives some hope for a strong seasonal upturn when and if auto sales pick up with the advent of warmer weather and the hoped-for spring sales upturn.

Compact Impact — Steelmakers are still trying to assess the impact of the compact cars on the steel market. General feeling is that compacts have helped stimulate auto sales and probably do not result in any total loss of steel.

However, with the large percentage of compacts now being produced, it can be estimated that in a 5.5 million car year, as much as 1,375,000 tons of steel would be "lost" from the total tonnage of steel when compared with the same number of cars in a pre-compact year.

The current automotive outlook, however, is not too encouraging. Dealer stocks are high and this week automotive layoffs are the rule.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	82	83	71	147
Buffalo	73	68	60	150
Pittsburgh	70	70	63	146
Youngstown	76	73	58	160
Cleveland	77	77	69	164
Detroit	102	99	74	159
Chicago	87	86	79	142
Cincinnati	87	76	79	141
St. Louis	85	78	75	128
Southern	80	80	83	138
Western	84	90	85	129
U. S. Index	80.5	79.6	71.1	146.4

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,499	1,482	4,342	8,168
Ingot Index				
(1957-59=100)	80.5	79.6	77.7	146.2
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel, base (cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.32	$66.41
Scrap No. 1 hvy (Gross ton)	$31.50	$31.50	$28.50	$42.50
No. 2 bundles	$22.17	$22.17	$18.83	$28.50

Performance Pressure Increases

The buyers market of today has brought about an increase in pressure for purchasing performance.

Crucible Steel Co.'s R. O. Bridge says this has kept buyers hopping recently.

■ Today's buyers market has increased rather than decreased the pressure for purchasing performance.

This fact shows up clearly in the purchasing operation of one large steel producer. Crucible Steel Co. of America spends more than $100 million a year for purchased goods and services. Producing a great variety of products, the company goes outside for iron ore, alloying materials, electrodes, paints, equipment and other products.

Stable Prices—Crucible's director of purchases, R. O. Bridge, says the past year has seen stable prices and plentiful supply in practically all major buying areas. Mr. Bridge says these conditions have kept buyers on the hop for three reasons:

1. With fast delivery offered for most products, purchasing works with a small margin of inventory protection.

2. Constant changes in the production picture demand speed and flexibility in purchasing.

3. In today's intense competition, purchasing must be alert to all chances to improve the company's cost position.

A Tighter Function—Mr. Bridge offers several examples of how supply changes have tightened the purchasing function. In shortage periods, Crucible carried an inventory of many million dollars in alloying materials.

Today, ferroalloy producers are offering very short deliveries. As a result, Crucible has reduced its alloy stockpile by several million lb. On abrasive products, the company has geared its buying at certain locations to a one-week turnover.

While operating with a light inventory cushion, purchasing must still be able to meet unexpected requirements. Like everyone else today, Crucible's customers are placing orders with a minimum of lead time. To get business the mill must be able to turn on a dime.

The Big Cut—Mr. Bridge and his men stay on top of new needs by cutting through normal communications channels. Weekly plant schedules are updated through daily contact with the plant.

As changes occur, orders go out to suppliers by phone. Crucible estimates 75 pct of its current orders are placed by phone. This procedure was a rarity in the past.

Supplier service and reliability are absolutely essential to this kind of buying pace. A missed delivery or a rejected shipment could mean costly production delays. Crucible uses domestic suppliers to insure quality and service.

Quality Conscious — The buyer today must be aware that his purchasing standards will affect his company's ability to meet the quality standards of customers. In line with this, Crucible is bearing down on quality requirements.

Some of these are temporary things, related to the current supply cycle, says Mr. Bridge. However, he sees permanent changes in concepts of service.

R. O. BRIDGE: "Purchasing must be alert . . . to improve cost position."

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ACCURACY—Campbell machines are production machine tools. They cut within close tolerances to reduce rejects and scrap loss. For example, the Model 406 will cut 3″ diameter material to lengths within ±.010″, 6″ diameter within ±.030″.

FINE FINISH—Additional finishing operations are rarely required. There is no burn, and burr has been reduced to an absolute minimum.

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WRITE FOR DETAILS—Bulletin DH-260 gives the complete story on the Campbell Model 406 abrasive cutting machine. We'll also be glad to send you information on other machines; just tell us your cut-off application. And remember—your Allison-Campbell Field Engineer is an abrasive cutting specialist. Call on him for expert advice.

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Deliveries Ease In Auto Centers

Delivery promises for flat-rolled steel have eased in Cleveland and Detroit.

This reflects the softening in the auto market and the wave of cutbacks from that industry.

■ The effect of automotive cutbacks is showing up in the delivery promises quoted for flat-rolled steel in the automotive and stamping centers of Detroit and Cleveland.

Other steelmaking areas have been quoting minimum mill times for delivery for several months. But these two centers, along with the West Coast, regularly quoted deliveries one to two weeks longer than the rest of the country.

Flat-Rolled Eases — The latest check made by The IRON AGE of delivery promises shows the lead time on flat-rolled products in Cleveland and Detroit has shortened by one to two weeks. This brings them generally into line with other areas. The West Coast remains an exception, where promises actually lengthened by a week for several products.

From all indications, customers are taking advantage of the short delivery promises: Orders are small; fast delivery is a must for the mill that is going to get an order. Steel inventories for many users are the materials in transit from mill to factory. And there is little incentive for manufacturers to build up in-plant stocks of raw materials.

Sheet and Strip — Automotive cutbacks are still troubling the market. Mills in just about all sections of the country are feeling the effects. "Automotive is the key to the market," says a sales manager on the **East Coast.** "Action by automotive steel buyers would trigger action from others." A mill spokesman in **Pittsburgh** says non-automotive demand is on such a short-term basis that it is difficult to say whether an upturn here will move fast enough to offset **Detroit** reversals. Smaller users are taking up part of the slack in **Cleveland** with firm forward buying. A few appliance manufacturers in **Northern Ohio,** are beginning to reorder sheet. Mills continue to discuss these mild gains in the **Midwest.** But they are doing little to boost output. **Chicago** area mills say the small gains from appliance, farm equipment and warehouse purchases haven't offset the loss in automotive business.

Bars — Producers are watching auto sales closely for signs of a pickup that would touch off new orders for bars. Meanwhile, hot-rolled bar mills are only limping along. **Cleveland** mills say there is some forward buying for February and March, but the gains are still minor. Hot-rolled bar mills in **Chicago** are operating at a slow pace, and some are still shut down.

Pipe and Tubing — Oil country seamless orders continue to move upward. A **Pittsburgh** mill notes this comes at a time when drilling is seasonally slow and when there is no expectation of an increase in drilling rates. This is taken to mean that business can get better on the strength of inventory alone. There has been a small increase in 4-in. and 8-in. seamless and electricweld noted by **Chicago** mills. And pipe jobbers are starting to boost inventories slightly, which is regarded as an encouraging sign.

Warehouses — One large warehouse in **Pittsburgh** has followed the lead of service centers in the **Midwest** in liberalizing quantity extras. The change was effective Jan. 18. It washed out the item-extra system established in May, 1959, for hot-rolled products. Other warehouses had not moved on the change by the end of last week. However, at least two indicated they would be competitive and were in the process of making the change. However, **East Coast** warehouses haven't moved to adjust to the new pricing pattern.

Delivery Promises at a Glance

	East	Pittsburgh	Cleveland	Detroit	Chicago	West Coast
CR Carbon Sheet	2–5 wks	2–4 wks	2–4 wks	1–4 wks	2–4 wks	4–5 wks
HR Carbon Sheet	2–4 wks	2–4 wks	1–3 wks	1–3 wks	2–3 wks	4 wks
CR Carbon Strip	2–5 wks	3–5 wks	2–4 wks	1–4 wks	2–3 wks	4 wks
HR Carbon Strip	2–4 wks	2–4 wks	1–3 wks	1–3 wks	2–3 wks	4–5 wks
HR Carbon Bars	1–4 wks	1–3 wks	1–4 wks	1–4 wks	Stock–3 wks	3–4 wks
CF Carbon Bars	1–4 wks	1–3 wks	Stock–4 wks	1–6 wks	1–4 wks	1–2 wks
Heavy Plate	1–3 wks	1–2 wks			1–2 wks	5 wks
Light Plate	1–3 wks	1–2 wks	1–3 wks		1–2 wks	4 wks
Merchant Wire	Stock	Stock	Stock		1–2 wks	2 wks
Oil Country Goods	Stock	Stock	Stock		Stock–1 wk	
Linepipe	Stock	1–4 wks	Stock		2–3 wks	2–3 wks
Buttweld Pipe	Stock	Stock	Stock	Stock	1–2 wks	Stock
Std. Structurals	1–4 wks	1–2 wks	1–4 wks	1–5 wks	1–2 wks	Stock–4 wks
CR Stainless Sheet	Stock–4 wks	Stock–3 wks	Stock–3 wks	Stock–4 wks		
CR Stainless Strip	Stock–4 wks	Stock–3 wks	Stock–3 wks	Stock–4 wks		

COMPARISON OF PRICES

(Effective January 23, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Jan. 23 1961	Jan. 16 1961	Dec. 20 1960	Jan. 26 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	Jan. 23 1961	Jan. 16 1961	Dec. 20 1960	Jan. 26 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.11	$70.57
Foundry, South Cin'ti	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	69.61	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb.‡	11.00	11.00	11.00	11-12¼
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.32	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$29.50	$29.50	$26.50	$44.50
No. 1 steel, Phila. area	35.50	35.50	33.50	41.50
No. 1 steel, Chicago	29.50	29.50	25.50	41.50
No. 1 bundles, Detroit	26.50	26.50	21.50	40.50
Low phos., Youngstown	34.50	34.50	28.50	49.50
No. 1 mach'y cast, Pittsburgh	44.50	44.50	44.50	55.50
No. 1 mach'y cast, Phila.	48.50	48.50	47.50	54.50
No. 1 mach'y cast, Chicago	45.50*	44.50	41.50	62.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$31.50	$31.50	$28.50	$42.50
No. 2 bundles	22.17	22.17	18.83	28.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	29.00	29.00*	30.00	33.00
Copper, Lake, Conn.	29.00	29.00*	30.00	33.00
Tin, Straits, N. Y.	100.50†	100.375	101.50	100.375
Zinc, East St. Louis	11.50	11.50	12.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Market Creates Little Excitement

The scrap market this week levelled off with only scattered price changes.

Proposals for freight and barge rate reductions for scrap leaving the Midwest have stirred interest.

■ The scrap market, though still generally firm, levelled off this week and only scattered price increases were reported.

Coastal port areas still report good export activity but only limited domestic buying. Inland markets are "cautious" with dealers and mills both holding out for a shift in prices.

Reductions in the rail freight rate for scrap from Chicago and St. Louis to New Orleans has been proposed. The present rate is over $16 per gross ton. The proposed rate is $10 per gross ton. Barge lines followed by proposing cuts in Chicago and Pittsburgh rates.

At least one Pittsburgh mill is arguing against the reduction and dealers say a lower rate would make it easier to pull export scrap from Pittsburgh and the Midwest. This could mean that Japan, for example, could pull scrap from steelmaking centers with a scrap deficit.

The IRON AGE composite price for No. 1 heavy melting remains unchanged this week at $31.50. The composite price for No. 2 bundles is also the same as last week at $22.17.

Pittsburgh—A note of caution has come into the market as local mills still show no interest in dealer scrap. The price of $37 for factory bundles has been confirmed by a sale to a district consumer. A mill in a nearby district is reportedly buying scrap aggressively. But the biggest local mills have not come into the market for any tonnage.

Chicago—Despite strong mill resistance, scrap prices are holding firm. Brokers report difficulty in covering existing orders. Some grades inched up and factory bundle lists for small lots moved up slightly in anticipation of reduced auto bundle output over February.

Philadelphia—Bad weather slowed most scrap operations in the area considerably this week. Export still holds the center of the stage, but there is a fair amount of domestic demand. Most prices are unchanged this week.

New York — The situation remains much the same as it did through most of 1960. There is no heavy pressure for a price movement in either direction. And there is still little or no domestic activity; export is the sole support of the market. The stainless picture is still hazy. However, there is activity and prices may be poised for a slight upward movement.

Detroit—The market seems no stronger. The majority of the dealers and brokers look for slightly weaker February industrial list prices. It depends on whether local mills will buy. Exporters are expected to show less interest and automakers will turn out less scrap next month. There are estimates that tonnage will be 15 pct lower than January.

Cleveland—The market slid slightly on dealer grades. Mills are still not interested in adding any inventory. Auto lists this week are expected to stay about the same level. Export speculation will probably continue, but tonnage will be smaller because of auto production cuts. The price of No. 2 heavy melting is up on appraisal.

Cincinnati—Slightly increased demand is expected in February from area mills. This means movement of some tonnage. Dealers are still reluctant to sell much scrap at present prices so it will depend on how bad the mills want it.

St. Louis—A stalemate seems to have been reached between dealers and mills. The mills refuse to pay higher prices and dealers are not anxious to sell at the present level. Out-of-area material is drifting in.

Birmingham—Most consumers filled their January needs early in the month and the market is slow. Only a few small sales are being made and prices are unchanged. However, the market still appears fairly firm and an upward trend could develop.

Buffalo—Based on outside markets and some export buying, almost all prices are up $2 this week.

Boston—Bad weather has hampered some scrap operations but both domestic and export demand is up. Sentiment is good among scrapmen.

West Coast—Exporting continues very strong. The flow of scrap into dealers' yards is slow and mills remain on the sidelines. Dealers don't look for any real life in the domestic market until mills start buying again.

Houston—The domestic market retains its status quo. The emphasis here is on export and shipments are being made to Mexico and Japan. Export brokers are having to scurry to get scrap although they say they aren't really worrying. Some purchases are being made spasmodically at a dollar or so above domestic quotations.

SCRAP PRICES *(Effective January 28, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	23.00 to 24.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	17.00 to 18.00
Low phos. punch'gs plate	36.00 to 37.00
Heavy turnings	25.00 to 26.00
No. 1 RR hvy. melting	35.00 to 36.00
Scrap rails, random lgth.	43.00 to 44.00
Rails, 2 ft. and under	47.00 to 48.00
RR specialties	42.00 to 43.00
No. 1 machinery cast.	44.00 to 45.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	175.00 to 180.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	85.00 to 90.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	35.50 to 36.50
No. 2 bundles	20.00 to 21.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	39.00 to 40.00
Low phos. punch'gs plate, ½ in. and heavier	37.00 to 38.00
Low phos. 2 ft. and under	35.00 to 36.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	54.00 to 56.00
Rails 2 ft. and under	47.00 to 48.00
Angles and splice bars	41.00 to 42.00
RR steel car axles	55.00 to 56.00
RR couplers and knuckles	38.00 to 39.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	40.00 to 41.00
Cast iron wheel	31.00 to 32.00
Malleable	43.00 to 44.00
Stove plate	34.00 to 35.00
Steel car wheels	38.00 to 39.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	95.00 to 100.00
430 bundles and solids	90.00 to 95.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	12.00 to 13.00
Mixed bor. short turn.	14.00 to 15.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	18.00 to 19.00
Clean cast. chem. borings	25.00 to 26.00
Low phos. 5 ft and under	38.00 to 39.00
Low phos. 2 ft punch'gs	40.00 to 41.00
Elec. furnace bundles	37.00 to 38.00
Heavy turnings	25.00 to 26.00
RR specialties	40.00 to 41.00
Rails, 18 in. and under	49.00 to 50.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	38.00 to 39.00
Cast iron car wheels	39.00 to 40.00
Malleable	45.00 to 46.00
No. 1 machinery cast.	48.00 to 49.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$24.50 to $25.50
No. 2 hvy. melting	22.50 to 23.50
No. 1 dealer bundles	25.50 to 26.50
No. 2 bundles	17.00 to 18.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Low phos. 18 in. and under	35.00 to 36.00
Rails, random length	38.00 to 39.00
Rails, 18 in. and under	44.00 to 45.00
No. 1 cupola cast.	35.00 to 36.00
Heavy breakable cast.	28.00 to 29.00
Drop broken cast.	45.00 to 46.00

Youngstown

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	16.00 to 17.00
Low phos. plate	34.00 to 35.00

Cleveland

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	29.00 to 30.00
No. 1 factory bundles	32.50 to 33.50
No. 2 bundles	19.00 to 20.00
No. 1 busheling	29.00 to 30.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Cut structural & plates, 2 ft & under	35.00 to 36.00
Low phos. punch'gs plate	30.00 to 31.00
Drop forge flashings	29.00 to 30.00
Foundry steel, 2 ft. & under	31.00 to 32.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails 2 ft. and under	45.00 to 46.00
Rails 18 in. and under	46.00 to 47.00
Steel axle turnings	23.00 to 24.00
Railroad cast.	45.00 to 46.00
No. 1 machinery cast.	45.00 to 46.00
Stove plate	39.00 to 40.00
Malleable	44.00 to 45.00
Stainless	
18-8 bundles	160.00 to 165.00
18-8 turnings	80.00 to 90.00
430 bundles	75.00 to 80.00

Buffalo

No. 1 hvy. melting	$25.00 to $26.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 busheling	25.00 to 26.00
No. 1 dealer bundles	25.00 to 26.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	13.00 to 14.00
Low phos. plate	33.00 to 34.00
Structurals and plate, 2 ft. and under	35.00 to 36.00
Scrap rails, random lgth.	34.00 to 35.00
Rails 2 ft. and under	44.00 to 45.00
No. 1 machinery cast.	42.00 to 43.00
No. 1 cupola cast.	36.00 to 37.00

St. Louis

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
Foundry steel, 2 ft.	28.00 to 29.00
No. 1 dealer bundles	28.00 to 29.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	7.00 to 8.00
Shoveling turnings	9.00 to 10.00
Cast iron borings	17.00 to 18.00
No. 1 RR hvy. melting	32.00 to 33.00
Rails, random lengths	37.00 to 38.00
Rails, 18 in. and under	39.00 to 40.00
RR specialties	39.00 to 40.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	31.00 to 32.00
Stove plate	34.00 to 35.00
Cast iron car wheels	33.00 to 34.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	33.00 to 34.00

Birmingham

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	9.00 to 10.00
Electric furnace bundles	34.00 to 35.00
Elec. furnace, 3 ft. & under	34.00 to 35.00
Bar crops and plate	38.00 to 39.00
Structural and plate, 2 ft.	37.00 to 38.00
No. 1 RR hvy. melting	32.00 to 33.00
Scrap rail, random lgth.	40.00 to 41.00
Rails, 18 in. and under	45.00 to 46.00
Angles and splice bars	36.00 to 37.00
No. 1 cupola cast.	45.00 to 46.00
Stove plate	45.00 to 46.00
Cast iron car wheels	35.00 to 36.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	20.00 to 21.00
No. 2 dealer bundles	15.00 to 16.00
Machine shop turnings	2.00 to 3.00
Mixed bor. and turn.	3.00 to 4.00
Shoveling turnings	5.00 to 6.00
Clean cast. chem. borings	17.00 to 18.00
No. 1 machinery cast.	36.00 to 37.00
Mixed yard cast.	32.00 to 33.00
Heavy breakable cast.	30.00 to 31.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	70.00 to 75.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$22.00 to $23.00
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	26.00 to 27.00
No. 2 bundles	18.00 to 19.00
No. 1 busheling	22.00 to 23.00
Drop forge flashings	22.00 to 23.00
Machine shop turn.	7.00 to 8.00
Mixed bor. and turn.	11.00 to 12.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Heavy breakable cast.	25.00 to 26.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	35.00 to 36.00
Stainless	
18-8 bundles and solids	145.00 to 150.00
18-8 turnings	45.00 to 50.00
430 bundles and solids	50.00 to 55.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$23.50 to $24.50
No. 2 hvy. melting	19.00 to 20.00
No. 1 dealer bundles	23.00 to 24.00
No. 2 bundles	12.00 to 13.00
No. 1 busheling	24.00 to 25.00
Machine shop turn.	2.50 to 3.50
Shoveling turnings	5.50 to 6.00
Clean cast. chem. borings	11.00 to 12.00
No. 1 machinery cast.	37.00 to 38.00
Mixed cupola cast.	29.00 to 30.00
Heavy breakable cast.	26.50 to 27.50

San Francisco

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 1 dealer bundles	$27.00 to 28.00
No. 2 bundles	18.00
Machine shop turn.	14.00
Cast iron borings	14.00
No. 1 cupola cast.	46.00 to 48.00

Los Angeles

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	17.00
Machine shop turn.	12.00
Shoveling turnings	13.00
Cast iron borings	13.00
Elec. furnace 1 ft. and under (foundry)	42.00
No. 1 cupola cast.	39.00

Seattle

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	31.00
No. 2 bundles	21.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$24.00
No. 2 hvy. melting cut 3 ft. and under	22.00
No. 1 dealer bundles	24.00
No. 2 bundles	16.00
Mixed steel scrap	16.00
Bush., new fact, prep'd	23.00
Bush., new fact, unprep'd.	18.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	30.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00
No. 2 hvy. melting	29.00
No. 2 bundles	20.50
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft. & under	$41.00 to 42.00
Unstripped motor blocks	26.00 to 27.00
Cupola cast.	33.00 to 34.00
Heavy breakable cast.	25.00 to 26.00

Copper Researches New Products

CPDA enlarges membership and discloses new plans and projects for product research.

One factor: Three of the projects are aimed at increasing use of copper in the automotive field.

■ One of the copper industry's main hopes for long-range growth, the Copper Products Development Assn., is maintaining its initial impetus in its search for new markets.

One indication: CPDA has announced six new members. These include some of the major producers in Africa and Canada. More important, this brings total membership in CPDA to 31, accounting for more than 90 pct of the Free World copper supply.

New Projects—At the same time, Dr. Charles H. Moore, technical director of the group, announced that six new projects have been authorized. They will get underway very shortly.

These are:

Catalytic Action of Copper in Engines—Armour Research Foundation, Chicago.

Feasibility of Anodic Treatment of Copper Alloys—Stanford Research Institute, Palo Alto, Calif.

Investigation into the Mechanics of the Surface Reactions of Copper—Applied Research Laboratories, Univ. of Arizona, Tucson.

Engineering Survey for New Uses for Copper in Electrical Industry—Battelle Memorial Institute, Columbus, O.

Investigation of Copper-Containing Catalysts for Catalytic Afterburners, and Investigation of Copper-Containing Organometallic Fuel Additives as Catalysts — Franklin Institute, Philadelphia.

Effect of Copper on the Corrosion of Pearlitic Cast Iron—Fulmer Research Institute, Stoke Poges, England.

Aimed at Autos—Perhaps the most significant thing in this list is the end uses which the probes are aimed. Three have as their goal increased use of copper by the auto industry—in engines, exhaust systems, or fuels.

Two are aimed at the development of a stainless copper—the primary goal of the CPDA. This, the industry feels, would open up such broad new markets that it would affect almost every industry.

One is aimed at the electrical industry, and one to expand the market for copper-bearing iron products such as diesel engines.

Next Steps—What's next in the way of projects? CPDA people say there is no shortage of ideas. At least 15 have passed the "casual scrutiny" stage and are getting serious consideration.

These include: Copper foil as an underlayer for countertop materials; rigidized plastic-foam-backed copper curtain wall materials; filled copper-powder plastics for such as boat hulls and appliance panels; soft-annealed copper foils for decorative packaging; refractory insulated copper wire with insulation an integral part of the wire.

Aluminum

Imports of crude aluminum and semi-fabricated shapes in November, last month for which figures are available, were down from the previous month. But exports were up, says the Aluminum & Magnesium Div., BDSA, U. S. Commerce Dept.

The 11-month, 1960, total for crude imports was about 33 pct under the same period in 1959. And the same total for semi-fabricated products was off by 25 pct.

Industry Plans — Cerro Corp., New York, has only to get stockholder approval of United Pacific Aluminum Corp. to acquire the West Coast producer of enamelled aluminum sheet and coil.

The boards of directors of both companies and Cerro stockholders have approved a stock exchange arrangement—one share of Cerro for each 4.77 shares of United Pacific.

While Cerro says this would give the company an "entry" into the coated aluminum sheet product market, there may be other considerations. United Pacific is understood to own some power rights, which could be the first step in setting up a primary production plant.

Tin prices for the week: Jan. 17—100.50; Jan. 18—100.875; Jan. 19—100.875; Jan. 20—100.625; Jan. 23—100.50*.

*Estimate.

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum ingot	26.00	24.70	12/17/59
Copper (E)	29.00	30.00	1/16/61
Copper (CS)	29.00	30.00	1/11/61
Copper (L)	29.00	30.00	1/16/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium ingot	36.00	34.50	8/13/58
Magnesium pig	35.25	33.75	8/13/58
Nickel	74.00	64.50	12/6/56
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 115.

NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 3/8
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	55.13	.....	52.36	56.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	51.75	52.04	51.69	55.81
Brass, Red	52.62	52.91	52.56	56.68
Brass, Naval	54.08	60.39	47.89	58.24
Muntz Metal	52.14	.....	47.45	.....
Comm. Bz.	54.03	54.32	53.97	57.84
Mang. Bz.	57.82	.....	51.42	.....
Phos. Bz. 5%	75.70	75.70	76.20	77.63

Free Cutting Brass Rod 34.88

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb) ... $1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz..... $35.00
Indium, 99.9% dollars per troy oz.. $ 2.25
Iridium, dollars per troy oz..... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $208 to $210
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz... $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 27.25
- No. 120 ..... 26.25
- No. 123 ..... 25.25

80-10-10 ingot
- No. 305 ..... 31.75
- No. 315 ..... 29.50

88-10-2 ingot
- No. 210 ..... 39.50
- No. 215 ..... 36.25
- No. 245 ..... 31.50

Yellow ingot
- No. 405 ..... 22.75

Manganese bronze
- No. 421 ..... 26.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 24.25-24.50
- 0.60 copper max. 24.00-24.25

Piston alloys (No. 132 type) .. 26.00-27.00
No. 12 alum. (No. 2 grade) ... 22.75-23.25
108 alloy 23.25-23.75
195 alloy 25.75-26.75
13 alloy (0.60 copper max.) ... 24.00-24.25
AXS-679 (1 pct zinc) 23.00-24.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-87½% 23.75-24.75
Grade 2—92-95% 22.50-23.50
Grade 3—90-92% 21.50-22.50
Grade 4—85-90% 21.00-22.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	25	24¼
Yellow brass	19¼	17⅜
Red brass	22¼	21½
Comm. bronze	23	22¼
Mang. bronze	18¼	17⅜
Free cutting rod ends.	18⅜	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 25
- No. 2 copper wire 22½
- Light copper 20¼
- *Refining brass 20¾
- Copper bearing material 20

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 24
- No. 2 copper wire 22¼
- Light copper 20
- No. 1 composition 19¾
- No. 1 comp. turnings 19
- Hvy. yellow brass solids 15
- Brass pipe 14
- Radiators 16

Aluminum

- Mixed old cast. ..... 12 —12½
- Mixed new clips ..... 13⅜—14¼
- Mixed turnings, dry ..... 12¾—13¼

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 21 —21½
- No. 2 copper wire ..... 19 —19½
- Light copper ..... 17 —17½
- Auto radiators (unsweated) .. 12 —12½
- No. 1 composition ..... 16 —16½
- No. 1 composition turnings... 15 —15½
- Cocks and faucets ..... 12¾—13
- Clean heavy yellow brass ... 12 —12¼
- Brass pipe ..... 13 —13½
- New soft brass clippings .... 13 —13½
- No. 1 brass rod turnings .... 12½—13

Aluminum

- Alum. pistons and struts .... 6½— 7
- Aluminum crankcase ..... 8½— 9
- 1100 (Ss) aluminum clippings 11½—12
- Old sheet and utensils ..... 8½— 9
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 9 — 9⅛
- 2020 (24s) clippings ..... 10 —10½

Zinc

- New zinc clippings ..... 6 — 6¼
- Old zinc ..... 3 — 3½
- Zinc routings ..... 2 — 2¼
- Old die cast scrap ..... 1¼— 1½

Nickel and Monel

- Pure nickel clippings 52-54
- Clean nickel turnings 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7 — 7½
- Battery plates (dry) ..... 3 — 3¼
- Batteries, acid free ..... 2 — 2¼

Miscellaneous

- Block tin ..... 75 —77
- No. 1 pewter ..... 57.50—58
- Auto babbitt ..... 43 —44
- Mixed common babbitt ..... 10 —10½
- Solder joints ..... 13½—14
- Small foundry type ..... 9 — 9½
- Monotype ..... 9 — 9½
- Lino. and stereotype ..... 8 — 8¼
- Electrotype ..... 7½— 7¾
- Hand picked type shells .... 5¼— 5⅜
- Lino. and stereo. dross ..... 2 — 2½
- Electro dross ..... 2¼— 2⅜

(Effective Jan. 23, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh Midland Butler Aliquippa N. Castle McKeesport Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3, B4, M10* 7.525 *E3*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.		*		6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

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STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* *1.25* lb. base box	Electro** *0.25* lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35c from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55c. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25c. **ELECTRO: 0.50-lb. add 25c; 0.75-lb. add 65c; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65c.		Prices are for 50 lb. base box; for 45 lb. deduct 15c; for 55 lb. add 15c; for 60 lb. add 30c.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*				$9.20 *U1*	$6.35 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*				Holloware Enameling 29 ga. *7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.		
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3,W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3,Y1*	6.275 *U1, I3,Y1*	6.875 *U1, I3*	6.775 *U1, I3,Y1*	7.225 *U1*	7.525 *U1, Y1,I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1,Y1*	$6.25 *U1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1†† R3*	7.525 *R3, S1*	9.275 *R3*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport Pa.	5.10 *U1, J3,P6*	6.275 *U1, J3,P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3,P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3,W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*		6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2,R3*	$10.50 *T2*	$9.20 *T2*	$6.35 *T2*
	Houston, Texas									6.65 *S2*			

* Electrogalvanized sheets. ** For 55 lb.; for 60 lb. add 15c.

†† 7.425 at Sharon; Niles is 7.225.

(Effective Jan. 23, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R5*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375*P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.		5.675 *B3*									
	Fairless, Pa.	5.825 *U1*	5.825 *U1*									
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875*L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*				7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*		7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.25 *A8*									8.00 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*	5.675 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Jan. 23, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.,
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structure I	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24				
Baltimore**	$.10	7.87	9.71	10.16	10.28	8.44	9.13	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham**		8.46	10.20	10.69	9.45	8.41	8.47	8.26	13.14	16.76	16.76		
Boston**	.10	9.84	10.68	11.87	12.26	9.72	10.26	9.87	13.45	17.79	16.79	23.89	21.14
Buffalo**	.15	8.80	9.95	11.40	11.15	8.80	9.30	8.90	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.94	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver**		10.90	12.53	13.27	13.07	10.74	11.24	10.88	12.97				20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		10.17	10.98	11.35[3]	11.73	9.90	9.81	9.58	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.59	11.42	10.95	11.76	9.43	9.93	9.57	11.77	17.17	15.87	21.87	21.12
Los Angeles**		9.50[1]	11.20	12.20	11.29	9.70	10.45	9.55	14.20	18.30	17.35	22.90	22.20
Memphis**	.15	9.13	10.50		10.79	8.81	9.16	8.97	12.89				
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.59
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20			8.90	8.65	9.20	8.90	10.70				
Philadelphia**	.10	8.45	9.70	10.76	10.45	8.80	9.05	8.85	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland**		9.45	11.30	12.35	11.45	9.60	10.05	9.45	16.65	18.60	17.80	22.70	22.20
San Francisco**	.10	10.27	11.79[2]	11.50	11.88	10.48	10.59	10.17	15.20	18.30	17.35	22.90	22.20
Seattle**		10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	10.51	11.57	12.50	11.95	10.10	10.65	9.94	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	9.57	10.75	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	8.94	9.84	10.99	11.16	8.83	9.33	8.97	11.64		16.69		21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—½" x 12"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝ to 15/16"; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13e zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Jan. 23, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	6..00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	73.00
Lyles, Tenn. *T3*	.....	.....	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
Sc. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31 0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container) — Pct

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective Jan. 23, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50–32.75	32.00	29.50–34.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7,* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13.* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only.).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Annld	Merch. Wire Galv.
	Col	Col	Col	Col	Col	¢ lb.	¢ lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3****	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer,Mass *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt.*B3***	175	.....	...	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

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RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I6*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.65
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.86	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

Rolled elliptical, 18 in. or longer, 5000 lb lots 43.50

Electrodeposited, 5000 lb lots ... 36.50

Brass, 80-20, ball anodes, 2000 lb or more 50.50

Zinc, ball anodes, 2000 lb lots 19.75

(for elliptical add 1¢ per lb)

Nickel, 99 pct plus, rolled carbon, 5000 lb 1.0225

(Rolled depolarized add 3¢ per lb)

Cadmium, 5000 lb 1.50

Tin, ball anodes $1.05 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum, N. Y.. 65.90

Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45

Nickel sulfate, 5000 lbs 29.00

Nickel chloride, freight allowed, 100 lb 45.00

Sodium cyanide, domestic, f.o.b. Chicago, 200 lb drums 24.00

Zinc cyanide, 100 lb, N. Y. 60.75

Potassium cyanide, 100 lb drum N. Y. 45.50

Chromic acid, flake type, 10,000 lb or more, N. Y. 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R.	11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots	25.75
Carbonyl Iron (200 lb lots)	88.00
Welding Grades	8.10
Cutting and Scarfing Grades	9.85
Hydrogen reduced, domestic	11.25

Copper Powders

Molding Grades	
Electrolytic, domestic, f.o.b. shipping point.	15.00†
Atomized	42.3 to 60.3
Reduced	15.00†
Chemically Precipitated	44.5
Brass, 5000-lb lots	32.3 to 48.9
Bronze, 5000-lb lots	50.3 to 54.2
Chromium, electrolytic	5.00
Lead	7.50†
Manganese, electrolytic ...	$1.00
Molybdenum .....$3.60 to $4.35	
Nickel	$1.15
Carbonyl Nickel, 20,000 lb lots	$1.01
Nickel-Silver, 5000 lb lots..	57.9 to 65.9
Silicon	70.00
Solder	7.00†
Stainless Steel, 316	$1.07
Stainless steel 304	89.00
Tin	14.00†
Titanium, 99.25 + pct, per lb, f.o.b.	$11.25
Tungsten, carbide grades...	$3.25
Zinc	19.5 to 32.7

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30		
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 43.40; 1 side, 36.35.

(Effective Jan. 23, 1961)

REFRACTORIES

Fire Clay Brick

	Carloads per 1000
Super duty, Mo., Pa., Md., Ky....	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk...	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00	
Childs, Hays	163.00
Chicago District	168.00
Western Utah	183.00
California	185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O. 163.00-168.00	
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union, Pa.	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md. $620.00	
Gary, Ind.	658.50
Standard, Pascagoula, Miss.	647.50
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Baltimore	585.00

Magnesite Brick

Standard, Baltimore $715.00	
Chemically bonded, Baltimore	655.00
Chemically bonded, Pascagoula, Miss.	682.50

Grain Magnesite

St. ⅛ to ½-in. grains

Per net ton

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b., Pascagoula, Miss...	80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	46.00
in sacks 52.00-54.00	

Dead Burned Dolomite

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

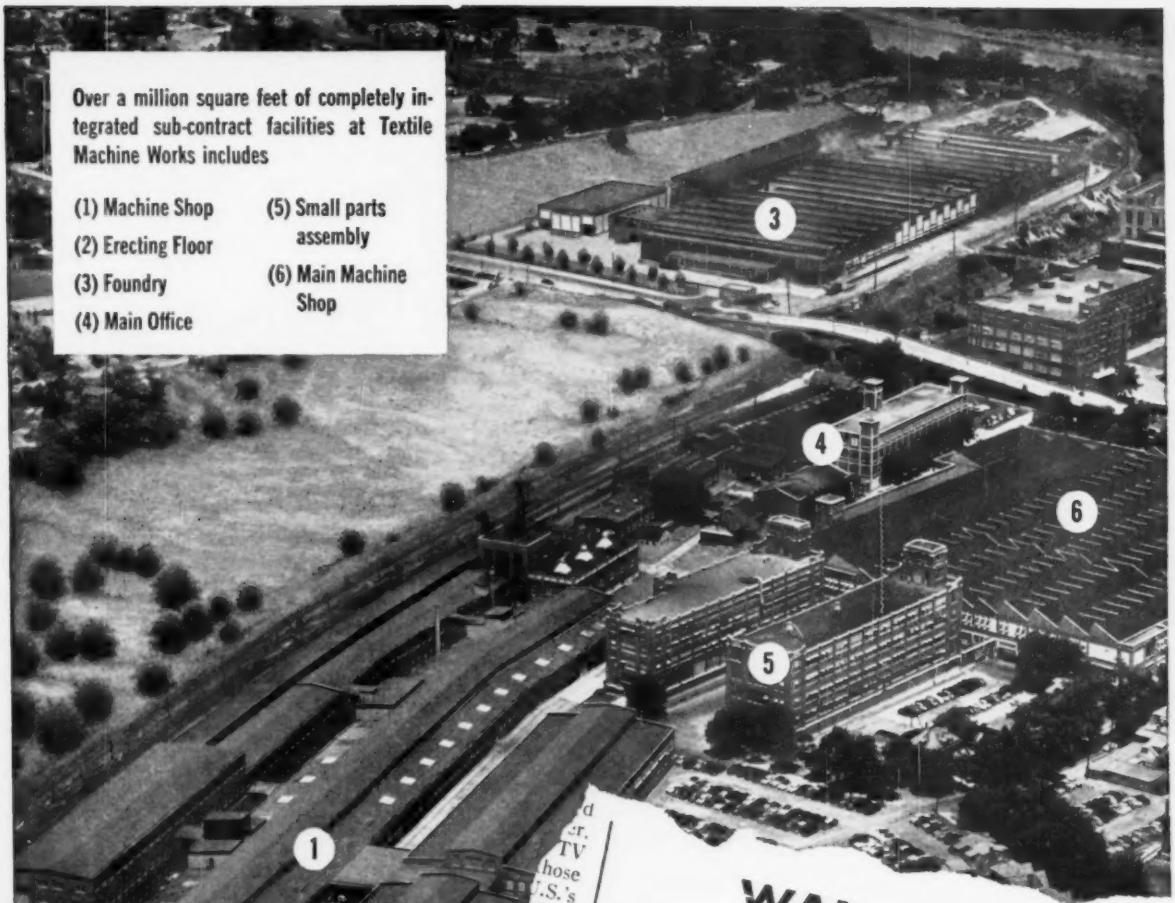
GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.



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CONTRACT DIVISION, READING, PENNA.

ELECTRICAL EQUIPMENT RE-NU-BILT GUARANTEED

M-G SETS 3PH-60 CY.

Qu.	KW	Make	RPM	DC Volts	DC Volts
2	4800(3U)	GE	450	300	2300/4600
1	2400	GE	450	300	2300/4600
1	2000	GE	514	600	2300/4600
2	1750/2100	GE	514	250/300	2300/4600
1	1750	GE	514	600	2300/4600
1	1500	GE	720	600	6600/13200
1	1000	GE	720	275	2300/4160
1	1000	GE	900	260	4000/6600
1	1000	GE	900	600	2300/4160
1	500	GE	900	125/250	440
1	500(New)	GE	1200	300	2300
1	500	GE	900	250	2300/4160
1	350	GE	900	125	440/2300/4160
1	300	GE	1200	275	2300/4160
1	300	GE	1200	250	440/2300
1	250	GE	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse.	1200	550	2300
1	200	El.Mfg.	1200	250	2300/4600
1	150	GE	1200	275	2300
1	150	Whse.	1200	275	2300

D. C. MOTORS

Qu.	KW	Make	Type	Volts	RPM
1	3900(New)	GE	Enc. S.V.	475	320
1	3000(New)	Whse.	Enc. F.V.	525	600
2	2700	GE	Enc. S.V.	415	280
1	2250(New)	GE	Enc. S.V.	600	300/300
1	2200	GE	MCF	600	400/500
2	2000	GE	Enc. S.V.	350	230/350
2	1750	GE	Enc. S.V.	250	175/350
1	1500	Whse.	New	600	300/700
4	1500	Whse.	New	525	600
1	1200	GE	MCF	300	200/400
1	1200	GE	MCF	600	150/600
1	1000	Whse.		500	800/2000
4	1000	GM	D-8	600	600/900
2	900	GE	MCF	250	180/360
1	850	GE	MCF	250	85/170
1	750	GE	MCF	600	120/360
2	750	GE	MCF	600	450/900
2	645	SS		500	1600
4	600	Whse.		250	275/550
5	400	GM	D-8	250	300/900

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34—COLD ROLLING MILLS

1—8" x 4" Standard w. Coilers 25 HP DC Motor
15—8" x 6" Standard w. Coilers 25 HP DC Motor
14—8" x 8" Waterbury-Farrel—25 HP DC Motor
2—8" x 8" Waterbury-Farrel (roll. brg.) 25 HP Motor
2—10" x 10" Blake & Johnson 40/65 HP DC Motor
All Mills with variable speed drives & Coilers, Edge Rollers, etc.

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RAILWAY CARS and REPAIR PARTS

AIR DUMP CARS
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All-Steel Construction
3—FLAT CARS
HOPPER CARS
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Dealers Optimistic In Philadelphia

Used machinery dealers in the Greater Philadelphia area are optimistic about the sales potential in the first quarter.

They say there is also some interest in leasing used machinery. Inquiries are up.

▪ Used machinery dealers in Philadelphia are generally optimistic about the prospects of first quarter business. They expect a definite upswing following a "tremendous" falloff in customer interest during the closing months of 1960.

Most estimates are that business will be up at least 15 pct in the Philadelphia area this year. Sales were well below expectations last year.

For the industry as a whole, the most recent figures released by the Machinery Dealers National Assn. show November sales down 2.4 pct from October. However, the sales in November were 8.2 pct higher than the same month of 1959.

Compared to October, 1960, the dollar value of inventories and the number of units in inventory rose slightly in November. These figures were up considerably over November, 1959.

In Philadelphia, dealers report that inquiries are now coming in at a rapid pace and they're "very optimistic" about converting many of these into orders.

Says one dealer from a Philadelphia suburb: "This is the best first quarter I've ever had as far as inquiries are concerned. I think many of these will become actual transactions before this quarter is over."

Like New York dealers, there are also reports here that the idea of used machinery leasing is catching on. Though very few dealers have anything tangible along these lines, several note that customers have inquired seriously about the possibilities.

And most of these dealers seem anxious to move in this direction. However, one says, "I can't really see any value in the long run to leasing equipment. I'm in the business to sell it and get it off my hands so I can buy more machinery with the capital. I personally think leasing—on a partial basis—is more trouble than it's worth."

He did admit though that he would probably make the move if enough customer interest were shown.

There is also increased interest on the part of dealers in the area of rebuilding machinery. "It seems," says one, "that we're facing a customer situation where they don't always want to go into the class of new machinery."

"I've been watching your work lately, Simmons — How about some?"

STAMPING and FORGING Equipt.

LOW PRICES • MONEY BACK GUARANTEE
LATE MODELS • INSPECTION UNDER POWER

TONS	MFGR	DESCRIPTION	BED	STR	SPM	YR
2000	Clear'g	Hydr. SS 1 pt.	56x48"	18"	50	'43
1500	Elmes	Hydr. Nobing	35x35"	12"	5	'52
1600	Nat'l, Bliss & Clearing			12"	65	'52
1300	Forge, Blank Coin, Impact			10"	80	'55
750	Extruding, W/T&B Knockouts			10"	85	'52
920	Toledo	#60 SS SC	47x72"	20"	14	'43
440	Toledo	#59¼ SS SC	41x48"	12"	11	—
380	Bliss	SS 4 pt. Susp.	170x65"	10"	18	'45
350	Verson	Hydr. SS 1 pt.	40x40"	32"	40	'44
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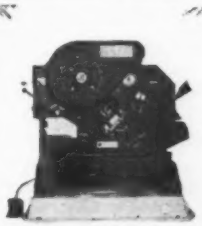

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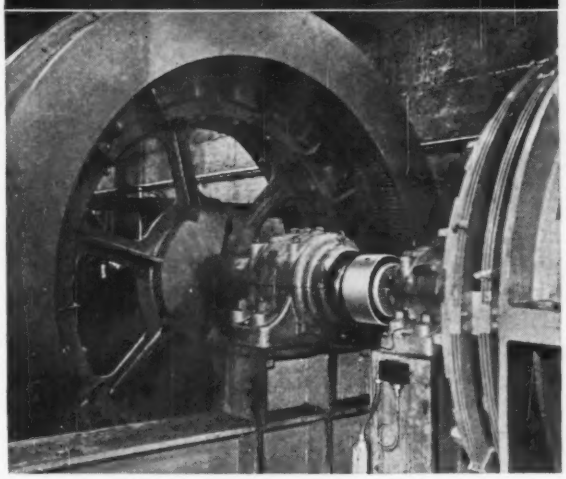

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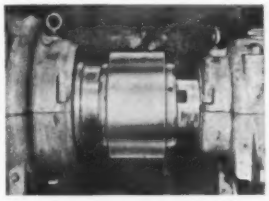

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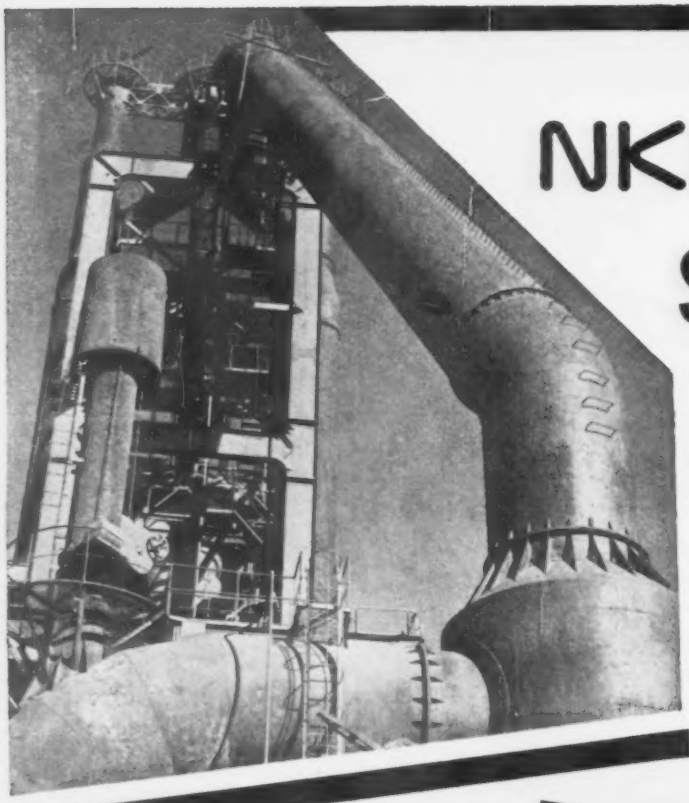

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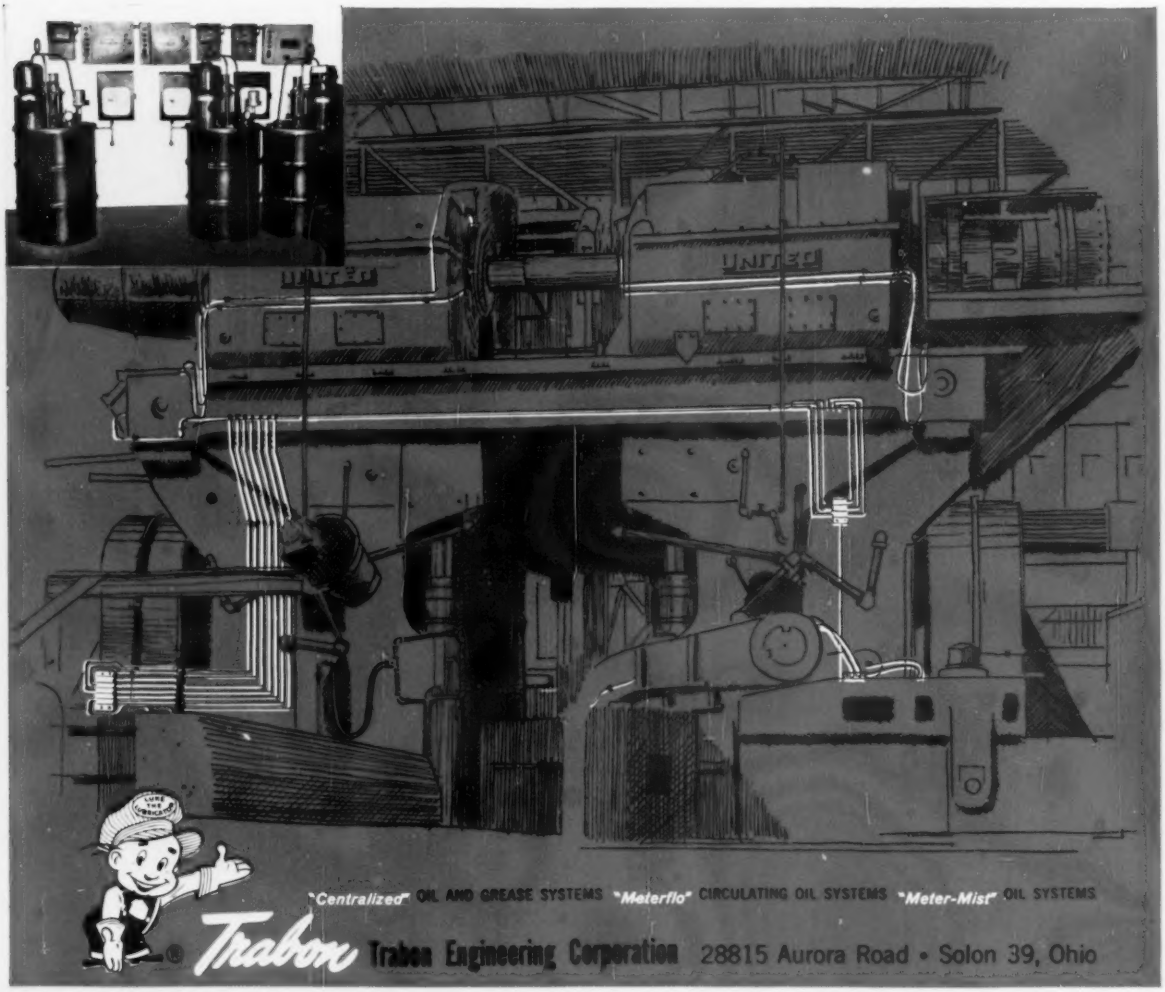

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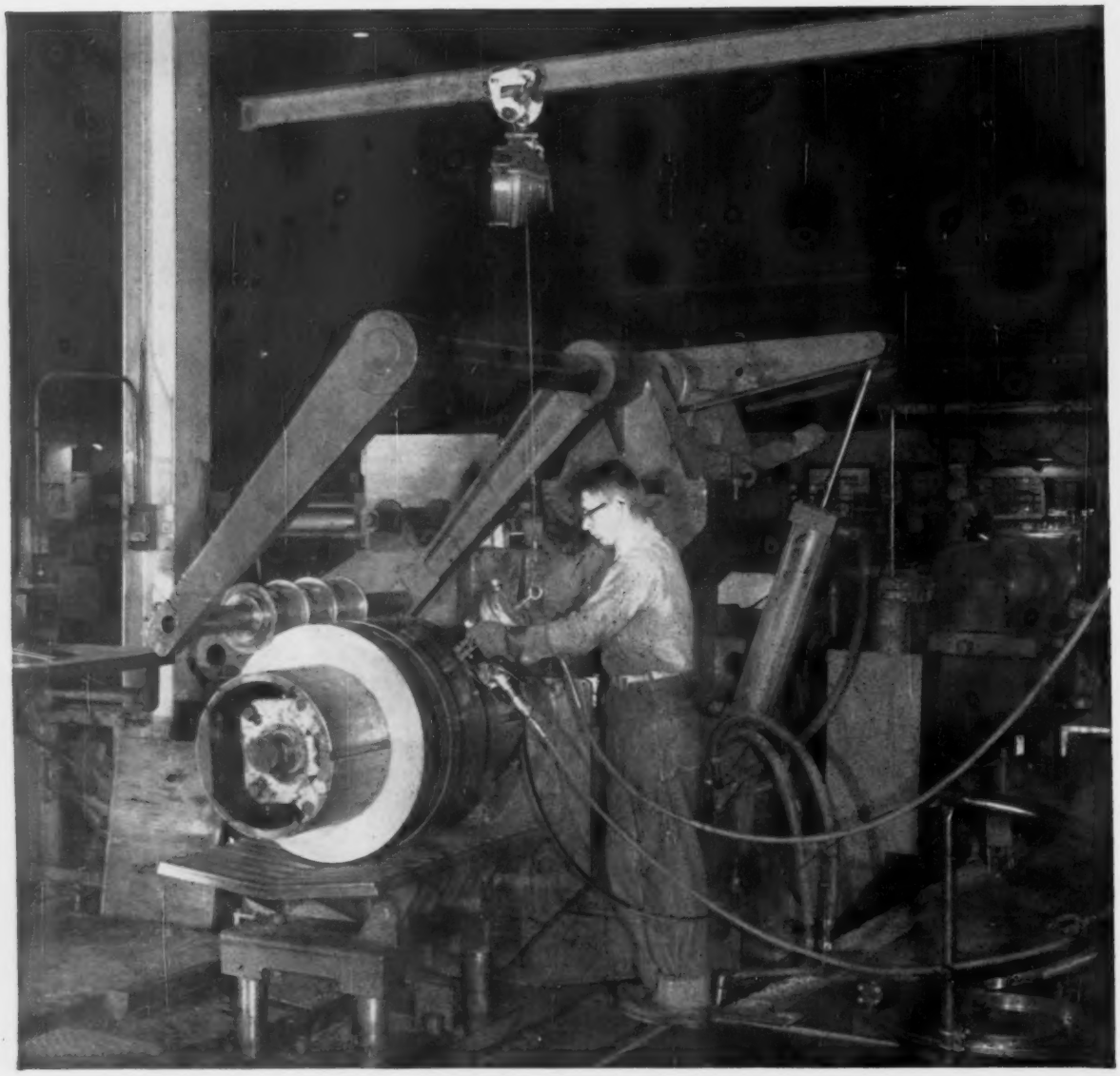

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